

1. Read from left to right

2. Title of microfiche (appears on each coordinate)

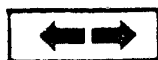
|             |                            |  |
|-------------|----------------------------|--|
| <b>E 16</b> | Product/assembly/test step |  |
|             | Vehicle/engine             |  |

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

**C 6**

**A1**

Trouble-Shooting Plan



## Rapid diagnosis' chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced Ecotronic expert to quickly check the electrical part of the system with the universal test adapter.

The rapid diagnosis chart contains the following information:

- Switch positions on universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other components
- Readings on multimeter or oscilloscope
- References to coordinates of the respective detailed testing and trouble-shooting program.

If detailed information and instructions are required, always proceed according to the trouble-shooting program starting on Coordinate B1/B2.










### Test conditions:

- Engine mechanically O.K. (valve timing, compression etc.)
- Ignition system and starting control O.K.
- Engine at operating temperature
- Set idle CO at idle-mixture-adjusting screw to 0.3... 0.7 % by vol. CO
- Connect (short-circuit) receptacle 1 and receptacle 2 on universal test adapter.

### Caution!

- Make sure that receptacle 1 does not come into contact with positive pole of supply voltage (e.g. red test wells). Control unit would be destroyed.
- Before disconnecting control-unit plug or adapter lead from control unit, always disconnect control relay for Ecotronic or wait for min. 20 seconds after switching off ignition.



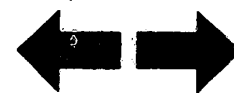
| Rapid diagnosis chart for universal test adapter |   |          |   |  |   |
|--|---|----------|---|--|---|
| Test step  | Switch position<br>V  | $\Omega$ | Remarks   | Test specifications<br>(reading)   | For trouble-shooting see<br>Coordinates |
| 1  |    | 1        | Make bridge on universal test adapter between receptacle 1 and receptacle 2. Ignition off - control unit not connected<br>Insulation resistance of pre-throttle controller (term. 15/term. 5) | $> 1 \text{ M}\Omega$  | B 14                                    |
| 2  |    | 3        | Resistance measurement on pre-throttle controller (term. 15/term. 14)   | $< 10 \Omega$  | B 18                                    |
| 3  |    | 6        | Resistance measurement on pre-throttle controller ground lead<br>(term. 6 /term. 5)   | $< 10 \Omega$  | B 22                                    |
| 4  |    | 8        | Resistance measurement on idle switch contact<br>Contact open - accelerator in rest position (term. 2/term. 5)  | $> 1 \text{ M}\Omega$  | C 1                                     |
| 5  |   | 8        | Resistance measurement on idle switch contact in part-load range<br>Contact closed - accelerator in part-load position (term. 2/term. 5)  | $< 60 \Omega$  | C 5                                     |
| 6  |  | 10       | Resistance measurement on "intake manifold" temperature sensor<br>(term. 22/term. 23)   | 20°C: $2 \text{ k}\Omega \dots 3 \text{ k}\Omega$<br>80°C: $280 \Omega \dots 360 \Omega$<br>(depends on temp.) | C 9                                     |
| 7  |  | 11       | Idle-speed increase:<br>Idle speed approx. $800 \text{ min}^{-1}$ (no increase)   | $> 1 \text{ M}\Omega$  | C 11                                    |
|  |   |          | Idle-speed increase (term. 13 to ground (term. 5) = $900 \text{ min}^{-1}$  | $< 10 \Omega$  |   |
| 8  |  | 13       | Insulation resistance of valves (term. 21/term. 5)  | $> 1 \text{ M}\Omega$ *  | C 13                                    |
| 9  |   | 16       | Resistance measurement, positive lead (term. 18/term. 35)<br>(Supply line for throttling-orifice actuator)  | $< 10 \Omega$  | C 15                                    |
| 10   |  | 17       | Resistance of solenoid-operated valve (evacuating)<br>in throttle-valve positioner (term. 33/term. 35)  | $40 \dots 100 \Omega$  | C 17                                    |
|  |   |          | * If set value is not reached, before trouble-shooting change over the connections on the multimeter.<br>If set value is now reached, test is O.K.  |  |   |

**A3**




Rapid diag. chart on univ.test adapter  
BMW 316, 518


**A4**

Rapid diag. chart on univ.test adapter  
BMW 316, 518



# Rapid diagnosis chart for universal test adapter

| Test step  | Switch position<br>V    Ω  | Remarks   | Test specifications<br>(reading) | For trouble-shooting see<br>Coordinates |
|--|--|---|----------------------------------|---|
| 11   |  18 | Resistance measurement on solenoid-operated valve (pressurizing)<br>(term. 34/term. 35)   | 40 ... 100 Ω                     | C 21                                    |
| 12   |  19 | Resistance measurement on ignition-control valve (term. 21/term. 35)  | 20 ... 70 Ω                      | D 1                                     |
| 13   |  20 | Resistance measurement on throttle-valve potentiometer and<br>throttle-valve positioner potentiometer (parallel)(term. 9/term. 6) | 0.7 kΩ ... 1.3 kΩ                | D 3                                     |
| Voltage measurement  |  |   |                                  |   |
| 14   | 3    20  | Voltage (terminal 15) Ignition switched off: (term. 4/term. 5)  | 0 V                              | D 9                                     |
| 15   | 3    20  | Voltage (terminal 15)<br>Switch on ignition (control unit not connected): (term. 4/term. 5)                                       | 10 ... 14.5 V                    | D 11                                    |
| 16   | 4    20  | Voltage supply (voltage at control relay) (term. 20/term. 5)  | 9 ... 13.5 V                     | D 13                                    |
| Switch off ignition. Connect control unit. Switch ignition on again. |  |   |                                  |   |
| 17   | 4    20  | Voltage at control relay (term. 20/term. 5)   | < 3 V                            | D 15                                    |
| 18   | 6    20  | Control unit supply voltage (term. 35/term. 5)  | 10 ... 14.5 V                    | D 17                                    |

**A5**

Rapid diag. chart on univ.test adapter  
BMW 316, 518






**A6**

Rapid diag. chart on univ.test adapter  
BMW 316, 518





# Rapid diagnosis chart for universal test adapter

| Test step   | Switch position |          | Remarks  | Test specifications (reading)  | For trouble-shooting see Coordinates |
|---|-----------------|----------|--|--|--------------------------------------|
|   | V               | $\Omega$ |  |  |                                      |
| 19  | 8               | 20       | Supply voltage for potentiometers (throttle valve and throttle-valve positioner) (term. 9/term. 5)   | 4.5 V ... 5.5 V  | D 19                                 |
| Connect ignition oscilloscope with black clip to black test well and with red clip to red test well of universal test adapter |                 |          |  |  |                                      |
| 20  | 10              | 20       | Start engine<br>Engine running and at operating temperature<br>Measurement of engine-speed signal (or pulses during cranking) (term. 26/term. 5)   |   | D 21                                 |
| 21  | 12              | 20       | Check throttle-valve positioner<br>Bring engine speed to 1500 ... 1800 min <sup>-1</sup> and hold.<br>Ram of throttle-valve positioner moves into overrun position.<br>Remove bridge between receptacle 1 and receptacle 2 on universal test adapter.<br>Release accelerator - engine stops.<br>(value may change by max. 0.2 V within 30 sec.) (term. 28/term. 5) | 0.7 ... 1.0 V<br><br>after 30 sec:<br>+ max. 0.2 V | D 23                                 |
| 22  | 13              | 20       | Check throttle-valve potentiometer:<br>Slowly depress accelerator<br>Voltage reading rises <u>steadily</u> between minimum and maximum (no voltage jumps) (term. 7/term. 5)  | Min.: 0.05 ... 0.6 V<br>Max.: 4.2 ... 5.5 V  | E 5                                  |
| 23  | 12              |          | Check throttle-valve positioner (pressurizing side):<br>Connect lead from receptacle 2 on universal test adapter to ground for <u>1 sec.</u> (e.g. black test well)<br><br><u>Caution! Under no circumstances bring receptacle 1 on universal test adapter into contact with positive (e.g. red test well).</u>  |  1 sec.<br><br>2.8 ... 4.2 V                      | E 7                                  |
| Re-establish bridge between receptacle 1 and receptacle 2 on universal test adapter. Start engine.                            |                 |          |  |  |                                      |

**A7**

Rapid diag. chart on univ. test adapter

BMW 316, 518



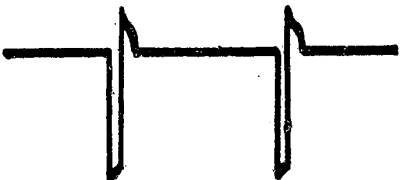
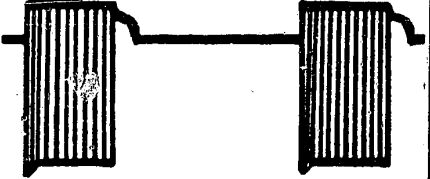
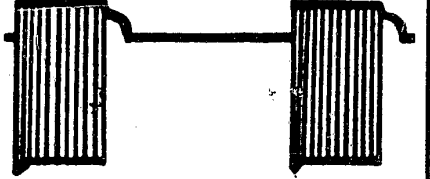
**A8**

Rapid diag. chart on univ. test adapter

BMW 316, 518



# Rapid diagnosis chart for universal test adapter

| Test step | Switch position<br>V    Ω | Remarks   | Test specifications<br>(reading)   | For trouble-shooting see<br>Coordinates |
|-----------|---------------------------|---|--|---|
| 24        | 14    20                  | Measurement of signal for pre-throttle controller (term. 15/term. 5)  |                     | E 11                                    |
| 25        | 14    20                  | Measurement of signal for pre-throttle controller<br>Press button 5 (universal test adapter) (simulation of cold engine)<br>→ signal becomes wider (term. 15/term. 5) |                     | E 15                                    |
| 26        | 14    20                  | Measurement of signal for pre-throttle controller:<br>(Checking of acceleration enrichment)<br>Briefly press accelerator - signal becomes wider                       |                    | E 17                                    |
| 27        | 14    20                  | Measure CO concentration in exhaust gas:<br>Press button 5 (universal test adapter)(simulation of cold engine)<br>→ CO concentration rises                            | 3 ... 6 % by vol.CO  | E 19                                    |
| 28        | 15    20                  | Voltage at pressurizing valve in throttle-valve positioner.<br>Note time!<br>Ignition "OFF" (term. 34/term. 5)  | Ignition OFF:<br>10 ... 14.5 V<br>after approx. 3 sec: < 1 V   | E 23                                    |
| 29        | 16    20                  | Switch on ignition.<br>Voltage at evacuating valve in throttle-valve positioner.<br>Note time!<br>Ignition "OFF". (term. 33/term. 5)                                  | Ignition OFF:<br>< 1 V<br>after approx. 3 sec:<br>10...14.5 V<br>after approx. 7 ...<br>15 sec.: < 1 V | F 1                                     |

**A9**

Rapid diag. chart on univ.test adapter  
BMW 316, 518

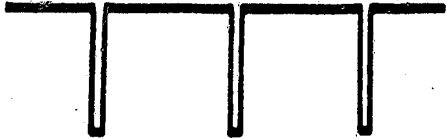



**A10**

Rapdi diag. chart on univ.test adapter  
BMW 316, 518



# Rapid diagnosis chart for universal test adapter

| Test step | Switch position |          | Remarks  |                    | Test specifications (reading)   | For trouble-shooting see Coordinates |
|-----------|-----------------|----------|--|--------------------|---|--------------------------------------|
|           | V               | $\Omega$ |  |                    |   |                                      |
| 30        | 17              | 20       | Start engine.<br>Signal for consumption computer   | (term. 11/term. 5) |  | F 3                                  |
| 31        | 17              | 20       | Signal for consumption computer<br>Press button 5 (universal test adapter)                                 | (term. 11/term. 5) |  | F 5                                  |
| 32        | 18              | 20       | Engine at operating temperature.<br>Energization of ignition-control valve<br>Accelerator in idle position | (term. 21/term. 5) | < 2 V   | F 7                                  |
| 33        | 18              | 20       | Energization of ignition-control valve<br>Accelerator in part-load position                                | (term. 21/term. 5) | 10 ... 14.5 V   | F 9                                  |

**A11**

Rapid diag.chart on univ.test adapter

BMW 316, 518



**A12**

Rapid diag. chart on univ.test adapter

BMW 316, 518



## TEST SPECIFICATIONS

|  |  |
|--|--|
| <u>Idle speed:</u>   | $800 \pm 50 \text{ min}^{-1}$                      |
| <u>with idle-speed increase:</u>                               | $900 \pm 50 \text{ min}^{-1}$                      |
| <u>Exhaust-gas setting:</u>                                    |  |
| CO concentration with engine at normal op. temp.:              | 0.3...0.7 % by vol. CO                             |
| <u>Fuel pressure:</u>  | 0.1...0.3 bar                                      |
| <u>Minimum fuel delivery</u><br>(at $2000 \text{ min}^{-1}$ ): | 1 l/min.   |
| <u>Weight of float:</u>  | $6.2 \pm 0.3 \text{ g}$                            |
| <u>Idle switch:</u>  |  |
| Switch open (throttle lever resting on switch):                | $> 1 \text{ M}\Omega$                              |
| Switch closed (throttle lever lifted off switch):              | $< 50 \Omega$                                      |
| <u>Throttle-valve potentiometer</u>                            |  |
| Total resistance:  | 1.4 ... 2.6 k $\Omega$                             |
| Wiper resistance in control range:                             | min. $< 250 \Omega$<br>max. 1.3...2.5 k $\Omega$   |
| <u>Pre-throttle controller (winding resistance):</u>           | 0.9 ... 1.7 $\Omega$                               |
| <u>Throttle-valve positioner:</u>                              |  |
| Evacuating valve (terminals 2+3):                              | 35 ... 80 $\Omega$                                 |
| Pressurizing valve (terminals 2+8):                            | 35 ... 80 $\Omega$                                 |
| Total resistance of potentiometer (terminals 4 and 5):         | 1.4 ... 2.6 k $\Omega$                             |
| Wiper resistance in control range (terminals 4 and 7):         | min. $< 500 \Omega$<br>max. 0.9 ... 1.9 k $\Omega$ |
| <u>Ignition-control valve:</u>                                 | 20 ... 50 $\Omega$                                 |



Throttle valve basic setting  
Stage II:

$0.05 \pm 0.02$  mm

Release and positive return  
Stage II:

y = 1.3 ... 1.7 mm

z = 0.1 ... 0.5 mm

Thermo-valve

No continuity:

below approx. + 48°C

Continuity:

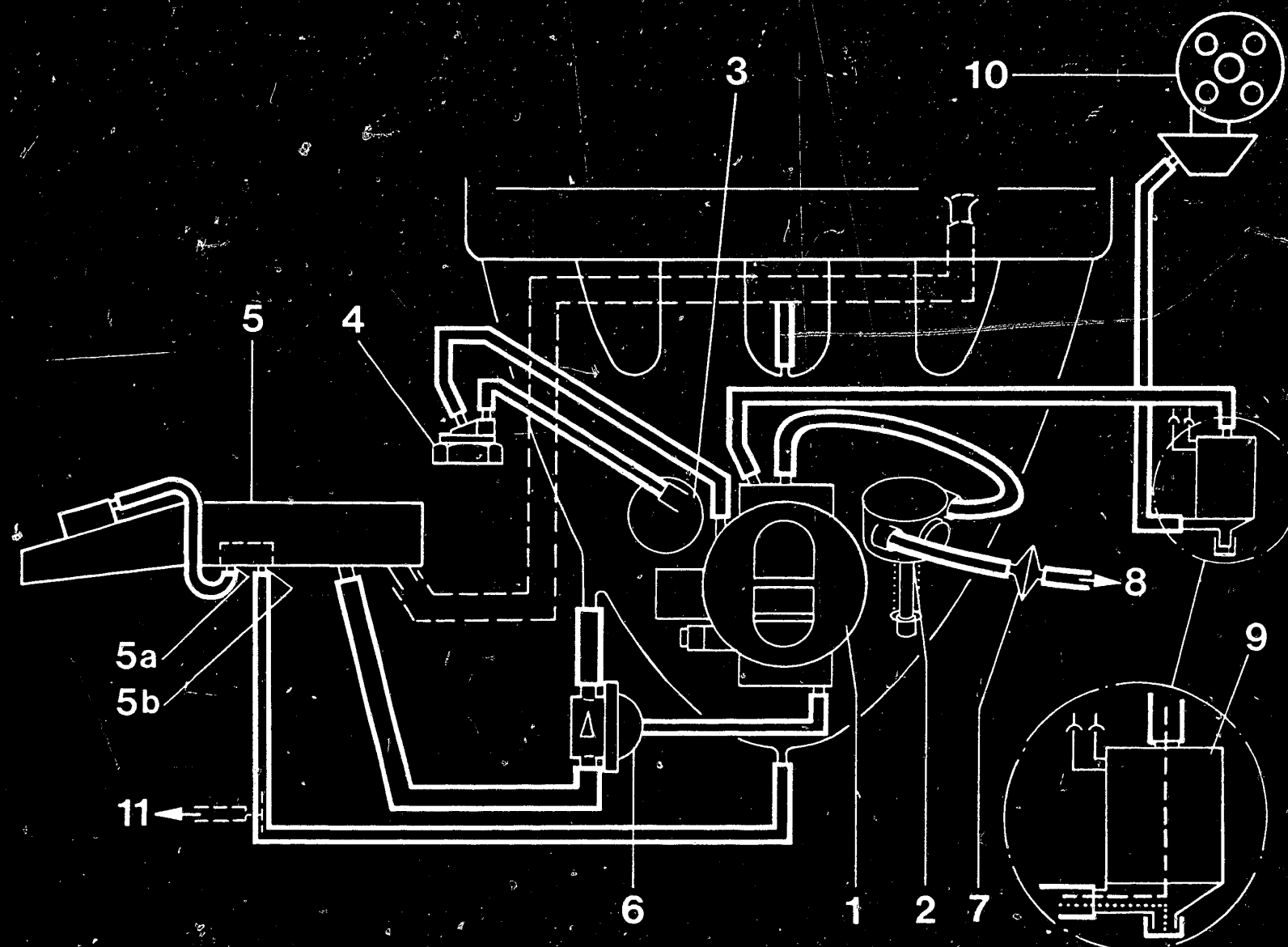
above approx. + 58°C

See equipment and Autodata microfiches for settings for ignition, valve clearance and other engine data.





- a = To ignition lock
- b = To consumption computer
- c = Setpoint idle speed increase  
(for increase connect to ground)



26010002

# DIAGRAM OF HOSES, VACUUM LINES

- |                               |                       |  |   |
|-------------------------------|-----------------------|--|---|
| 1 = Carburetor                | 5 = Air filter        | 7 = Filter   | 10 = Ignition distributor   |
| 2 = Throttle-valve positioner | 5a = Brass tube       | 8 = To passenger compartment (near glove compartment)            | 11 = To temperature sensor (passenger compartment) (BMW 518 only) |
| 3 = Stage II vacuum unit      | 5b = Plastic tube     | 9 = Electric change-over valve (ignition timing control at idle) |   |
| 4 = Thermo-valve              | 6 = Overrun air valve |  |   |

**A17**

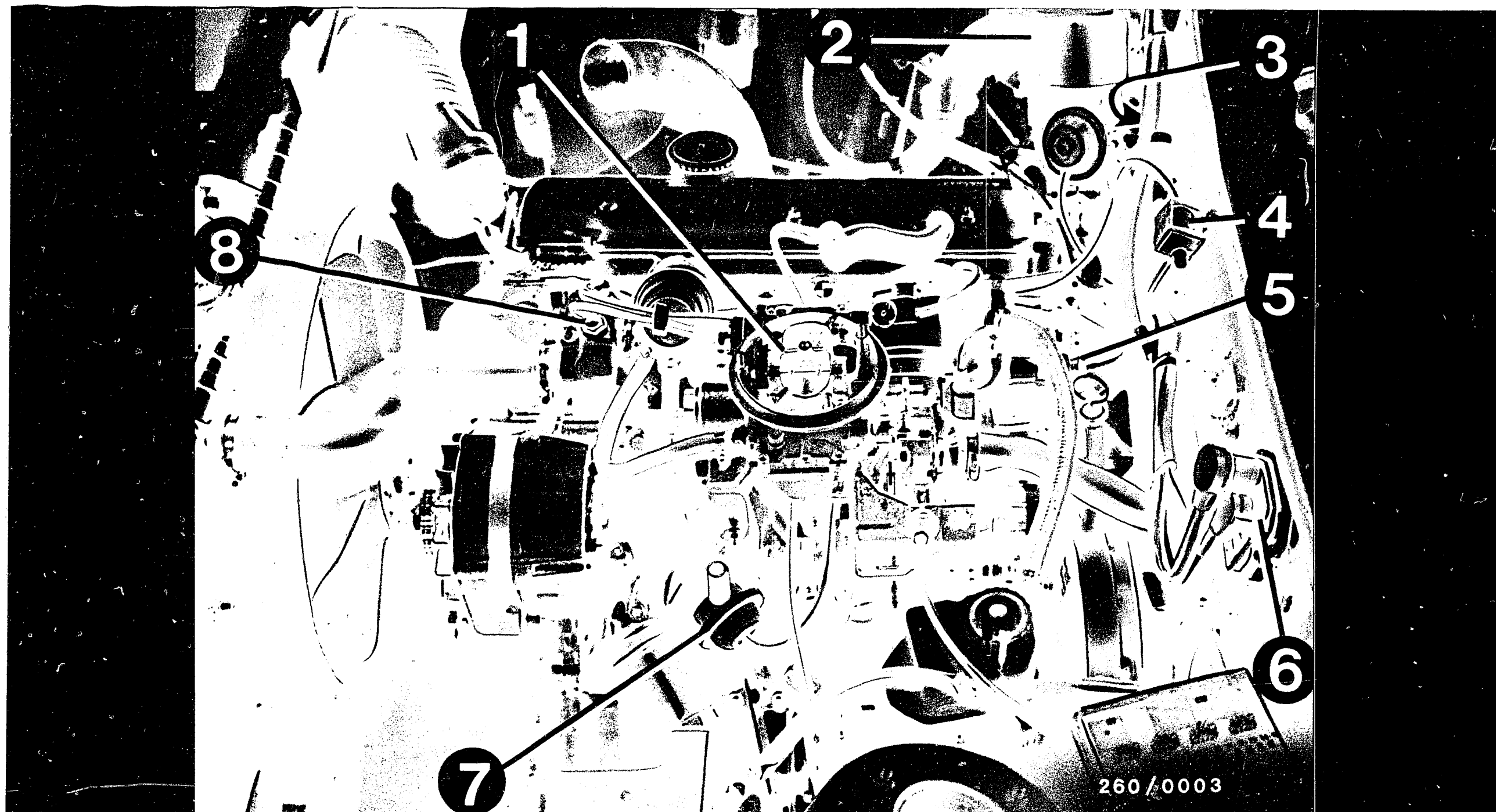
Diagram of hoses, vacuum lines  
BMW 316, 518



**A18**

Diagram of hoses, vacuum lines  
BMW 316, 518





# INSTALLATION POSITION OF COMPONENTS (BMW 316)

- |   |  |   |
|---|--|---|
| 1 = Carburetor                                    | 4 = Electric change-over valve         | 7 = Overrun air valve                     |
| 2 = Ignition distributor                          | 5 = Intake manifold temperature sensor | 8 = Thermo-valve for stage II vacuum unit |
| 3 = ECOTRONIC control unit (in glove compartment) | 6 = Ignition trigger box               |   |

The control unit is in the passenger compartment, front-passenger side, above glove compartment.

**A19**

Installation position of components

BMW 316, 518



**A20**

Installation position of components

BMW 316, 518





## TEST EQUIPMENT AND TOOLS

| Description   | Designation  | Part no.   |
|---|--|--|
| Universal test adapter                                    | ETT 018.01   | 0 684 101 801  |
| Adapter lead  |  | 1 684 463 146  |
| Motortester   | e.g. MOT 206   | 0 684 000 206  |
| Exhaust-gas anal.   | e.g. ETT 008.00  | 0 684 100 800  |
| Pressure/vacuum tester                                    | e.g. ETT 007.01  | 0 684 100 701  |
| Feeler gauge for adjusting throttle-valve part (6.84 mm)  |  | Obtainable from:<br>Firma Korinth<br>Ludwig-Kloos-<br>Straße 21<br>6450 Hanau 7 -<br>Steinheim |
| Measuring tool for throttle-valve adjustment              |  | Obtainable from:<br>Firma Korinth  |
| Corrosion inhibitor or Unispray                           | WD 40  | Commercially available   |
| Electrics tester, digital multimeter or multi-range meter | e.g. ETE 014.00<br>e.g. MMD 301<br>e.g. Fluke 75<br>Fluke 23 | 0 684 101 400<br>0 684 500 301<br><br>Commercially available                                   |
| Vacuum pump   | e.g. Mityvac   | Obtainable from:<br>Firma Korinth  |



## IMPORTANT GENERAL INFORMATION

Be sure to follow instructions in order to prevent damage to engine, control unit and ignition coil and in order also to avoid risk to persons.

1. Never start engine without battery firmly connected.
2. Incorrect polarity of supply voltage, e.g. through incorrect connection of battery or ignition coil, may lead to destruction of control unit.

3. Do not use a fast charger for starting the engine.  
Starting aid only with second 12 V battery and jump leads.

### Caution!

Owing to different vehicle manufacturer requirements for electronic products, we advise against using 24 V batteries as a starting aid. Follow vehicle owner manual.

4. Disconnect battery from vehicle electrical system before fast charging.
5. When charging battery in vehicle or when providing starting aid, follow operating instructions for fast charger as well as instructions of vehicle manufacturer.
6. Never disconnect battery from vehicle electrical system with engine running.
7. Do not short-circuit terminal 1 of ignition coil to ground (e.g. for stopping the engine). Ignition coil and possibly also control unit will be destroyed.



8. Never disconnect or connect wiring-harness plug of control unit with ignition on.  
Beforehand, disconnect control relay or wait approx. 20 seconds after switching off ignition.
9. Remove control unit at temperatures above 80°C (paint-drying installation).
10. Remove control unit before carrying out welding work (electric spot welding).

CAUTION!

High-energy ignition system.  
Dangerous primary and  
secondary voltages.



The above-shown sticker has the following significance:

The vehicle has a high-energy ignition system which can be dangerous if live parts or terminals are touched (both on the primary as well as on the secondary side).



## T R O U B L E - S H O O T I N G

The following trouble-shooting program starts with the trouble-shooting chart (B 3 ... B 6) in which reference is made to the possible causes of trouble according to the fault symptom (customer complaint).

In each cause column there is a reference to the first coordinate of the test section in which the test on the respective function is described in detail.

The trouble-shooting program has been designed so that direct trouble-shooting is possible according to the trouble-shooting chart (B 3 ... B 6).

**B1**

Trouble-shooting

BMW 316, 518

**B2**

Trouble-shooting

BMW 316, 518

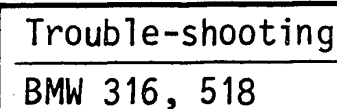


The test with the universal test adapter must come at the beginning of the test program and must be performed from beginning to end (see Coordinates B 7 - F 11).

Customer complaint (fault symptom)

1. Engine fails to start or starts only with difficulty
2. Engine starts but then dies
3. Cold idle speed too high/too low
4. Cold driveability poor, bucking
5. Incorrect idle
6. Idle CO not adjustable
7. Bucking when accelerating
8. Bucking during steady driving
9. Hot-starting problems
10. Insufficient power
11. Fuel consumption too high
12. Muffler explosions on overrun
13. Engine frequently stalls when declutching

|   |   |   |   |   |   |   |   |   |   |   |   |   | Cause (component fault)               | Coordinates |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---------------------------------------|-------------|
| • | • | • | • | • | • | • | • | • | • | • | • | • | Test with universal test adapter      | B 7         |
| • |   |   |   |   |   |   |   |   |   |   |   |   | Driver error                          | F 12        |
|   | • | • | • | • | • | • | • |   |   |   |   |   | Vacuum system leaking (unmetered air) | F 12        |
| • | • |   |   | • |   |   | • |   | • |   |   |   | Fuel pressure outside tolerance       | F 13        |
| • | • |   |   |   |   | • | • | • | • | • |   |   | Fuel not according to DIN             | F 14        |
| • | • |   |   | • |   | • | • |   | • |   |   |   | Filter in fuel inlet fouled           | F 14        |
|   |   | • | • |   |   |   | • |   | • |   |   |   | Icing/preheating defective            | F 15        |
| • |   |   |   | • | • | • | • |   |   |   |   | • | Overrun air valve defective           | F 17        |
| • | • | • | • | • |   |   | • | • |   | • |   |   | Temperature sensor defective          | F 18        |
|   |   |   |   | • | • |   |   |   |   |   |   |   | Idle adjustment/CO not correct        | F 19        |



# Customer complaint (fault symptom)

1. Engine fails to start or starts only with difficulty
2. Engine starts but then dies
3. Cold idle speed too high/too low
4. Cold driveability poor, bucking
5. Incorrect idle
6. Idle CO not adjustable
7. Bucking when accelerating
8. Bucking during steady driving
9. Hot-starting problems
10. Insufficient power
11. Fuel consumption too high
12. Muffler explosions on overrun
13. Engine frequently stalls when declutching

|   |   |   |   |   |   |   |   |   |   |   |   | Cause (component fault), | Coordinates  |   |     |
|---|---|---|---|---|---|---|---|---|---|---|---|--------------------------|--|---|-----|
|   |   |   |   |   |   |   |   |   |   | • | • |                          | Stage I throttle valve not opening (closing) fully                   | F 22  |     |
| • | • | • | • | • | • | • | • | • | • | • | • |                          | Pre-throttle valve/idle-air correction needle sticking or stiff      | G 1   |     |
| • | • |   |   | • | • |   | • | • | • | • | • |                          | Float defective/level incorrect, float needle sticking/valve leaking | G 4   |     |
|   |   |   | • |   |   | • | • |   | • | • |   |                          | Incorrect jet sizes  | G 5   |     |
|   |   | • |   | • | • | • | • |   |   |   |   | •                        | Throttle shaft worn  | G 8   |     |
|   |   | • |   | • | • |   |   |   |   |   |   | •                        | •  | Adjustment of throttle-valve part (stage I) not correct | G 9 |
|   |   |   | • |   |   |   | • |   | • |   |   |                          | Stage II vacuum unit or thermo-valve defective                       | G 14  |     |
|   |   |   |   | • | • | • | • |   | • |   |   | •                        | Basic setting of stage II throttle valve not correct                 | G 16  |     |
|   |   |   |   |   |   |   |   | • | • |   |   |                          | Release and positive return of stage II not correct                  | G 18  |     |
|   |   |   |   | • | • | • | • | • | • | • | • |                          | Stage II fuel shutoff valve defective                                | G 4   |     |
| • | • | • | • | • | • | • | • | • | • | • | • |                          | Dirt in carburetor/corrosion   | H 1   |     |
|   |   |   |   |   |   |   |   |   |   |   |   | •                        | Throttle-valve positioner defective                                  | H 9   |     |
|   |   |   |   |   |   |   |   |   |   |   |   |                          | Operation of ignition-control valve incorrect                        | H 12  |     |

B5

Trouble-shooting  
BMW 316, 518



B6

Trouble-shooting  
BMW 316, 518



## TEST CHART FOR UNIVERSAL TEST ADAPTER ETT 018.01

### with connected adapter lead for Ecotronic

To test the wiring harness and the components connected to it, the Ecotronic adapter lead is connected only to the control-unit plug. For the active test, starting with test step 17, the adapter lead is also connected to the control unit.

#### Caution!

Before disconnecting the adapter lead or the control-unit plug from the control unit, wait for min. 20 seconds after switching off the ignition.

To make the measurements, a measuring instrument for voltage and resistance (multimeter) as well as the motortester must be connected to the test adapter.

The individual test steps are selected with the program switch. The symbols "V" and " $\Omega$ " show the operator whether voltage or resistance is being measured. Some switch positions are also required for simulation with the engine running. By pressing the buttons it is possible with the control unit connected and the engine running to simulate operating conditions. Thus, for example, with the engine at normal operating temperature it is possible by pressing button T 5 to make the control unit think that the engine temperature is  $-20^{\circ}\text{C}$ . The reaction of the control unit can then be evaluated on the motortester.

If necessary, the circuit diagram can be used for trouble-shooting.



## Preparations for testing with the universal test adapter

Open glove compartment.

Remove pin (top picture - 1) of both retaining bands.

Loosen screws and place cover to one side.

Press back detent (centre picture - 1) and remove control-unit plug.

Connect Ecotronic adapter lead and control-unit plug.

### Note:

To prevent confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and closing the control unit) and the appropriate mount on the control unit have matching recesses and pins.

### Caution:

The plugs (centre picture - 3) must be connected.

Ensure correct polarity.

Test condition:

- Engine mechanically O.K. (valve timing, compression etc.)
- Ignition system and starting control O.K.

Short-circuit receptacle 1 and receptacle 2 on universal test adapter (test lead).

### Caution:

Ensure that receptacle 1 on the universal test adapter never comes into contact with positive pole of supply voltage (e.g. red test sockets). The control unit would be destroyed.

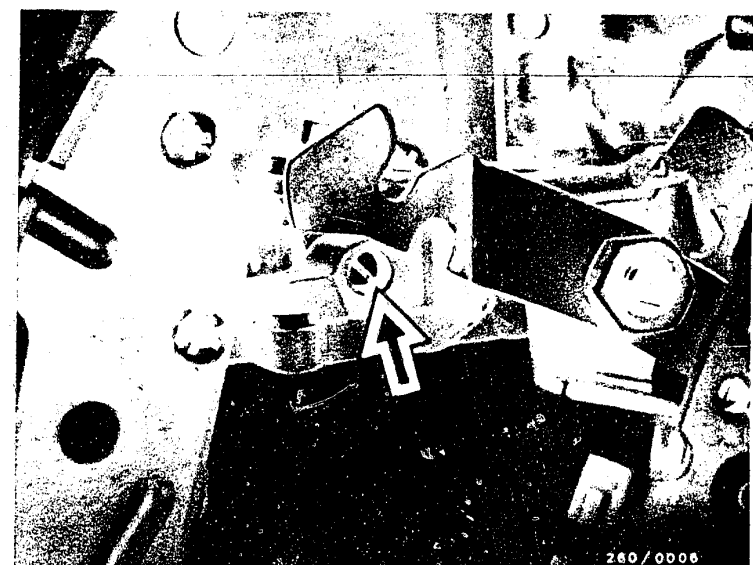
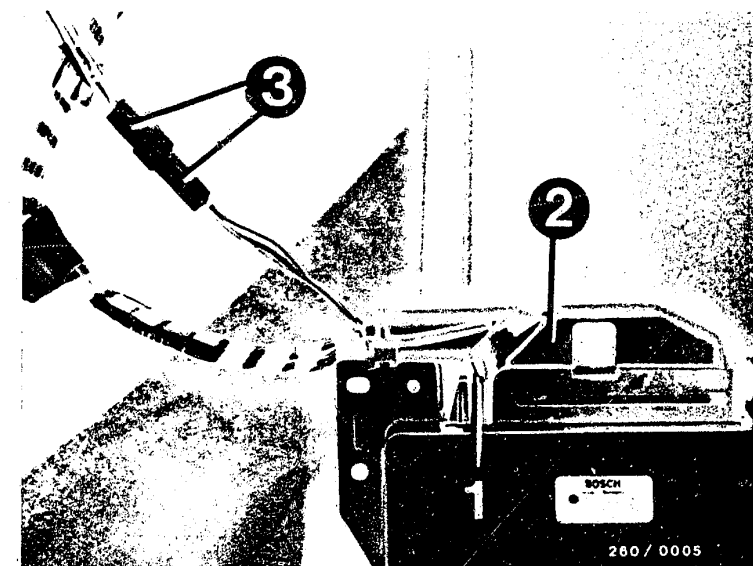
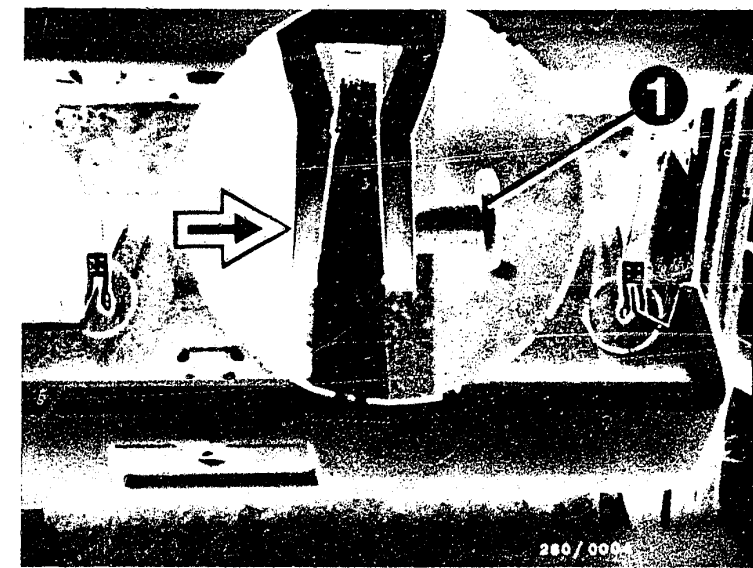
Bring engine to operating temperature.

Set idle CO at idle-mixture-adjusting screw (bottom picture - arrow) to 0.3 ... 0.7 % by vol. CO.

If the engine fails to start, test with the universal test adapter as far as "start engine" and then continue with the trouble-shooting program (customer complaint).

### Note:

In the following test steps a white border in the "Operation" column indicates which operation has to be changed in comparison with the preceding test step.



**B8**

Test chart for universal test adapter  
BMW 316, 518

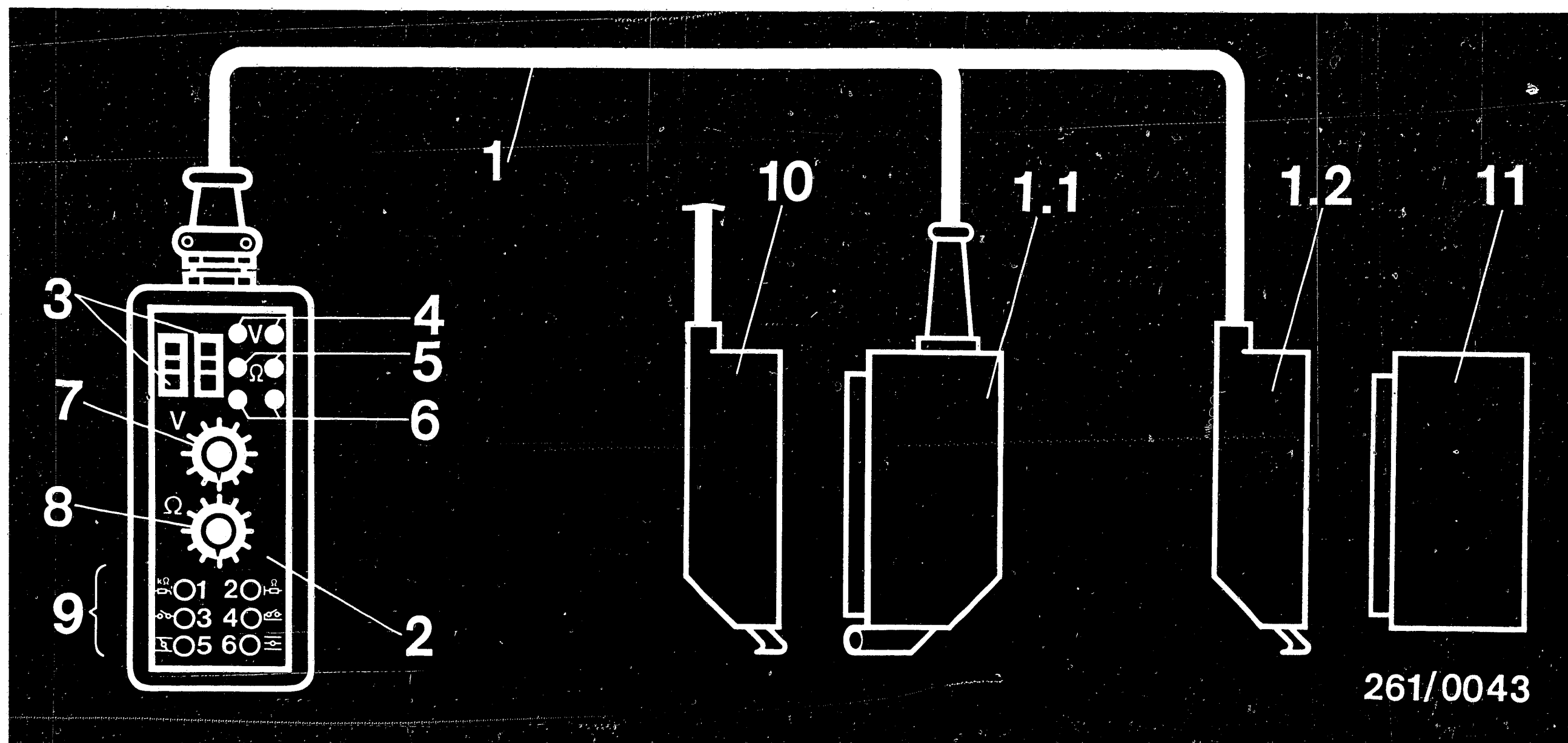


**B9**

Test chart for universal test adapter  
BMW 316, 518







# Universal test adapter with adapter lead for Ecotronic

- 1 = Adapter lead
  - 1.1 Connection to wiring harness
  - 1.2 Connection to control unit
- 2 = Universal test adapter  
(Part no.: 0 684 101 801)
- 3 = Test wells (for motortester)

- 4 = Test sockets (for voltage measurement)
- 5 = Test sockets (for resistance measurement)
- 6 = Sockets (must be bridged for testing Ecotronic)
- 7 = Program switch "V"
- 8 = Program switch "Ω"

- 9 = Button panel for simulating operating conditions
  - Button 5 = NTC cold (-20°C)
  - Button 6 = NTC hot (+80°C)
  - Button 3 = Energization of evacuating valve
- 10 = Ecotronic wiring harness
- 11 = Control unit

**B 10**

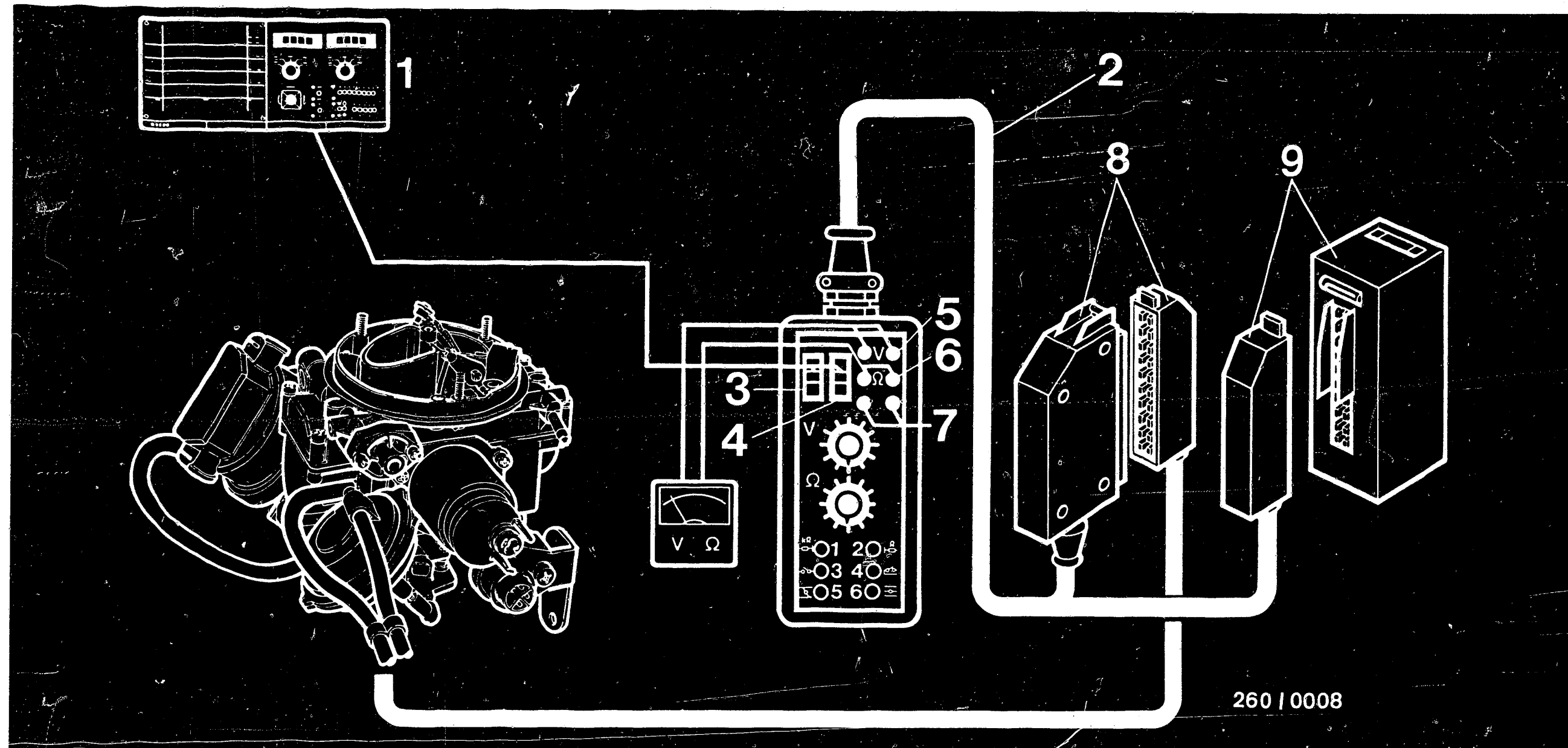
Test chart for universal test adapter  
BMW 316, 518



**B 11**

Test chart for universal test adapter  
BMW 316, 518





### Connection for universal test adapter

- 1 = Motortester
- 2 = Adapter lead for Ecotronic
- 3 = Red socket (test well for red clip of motortester)
- 4 = Black socket (test well) for black clip of motortester

- 5 = Connection of voltmeter to V sockets (red = +, black = ground/negative)
- 6 = Connection of ohmmeter to  $\Omega$  sockets (blue)
- 7 = Short-circuit connector between socket 1 and socket 2
- 8 = Connection to Ecotronic wiring harness
- 9 = Connection to Ecotronic control unit

**B 12**


Test chart for universal test adapter  
BMW 316, 518

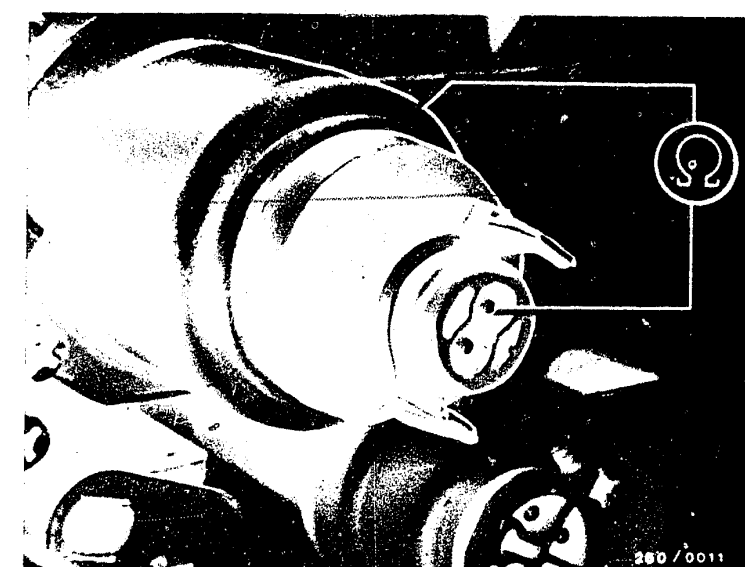
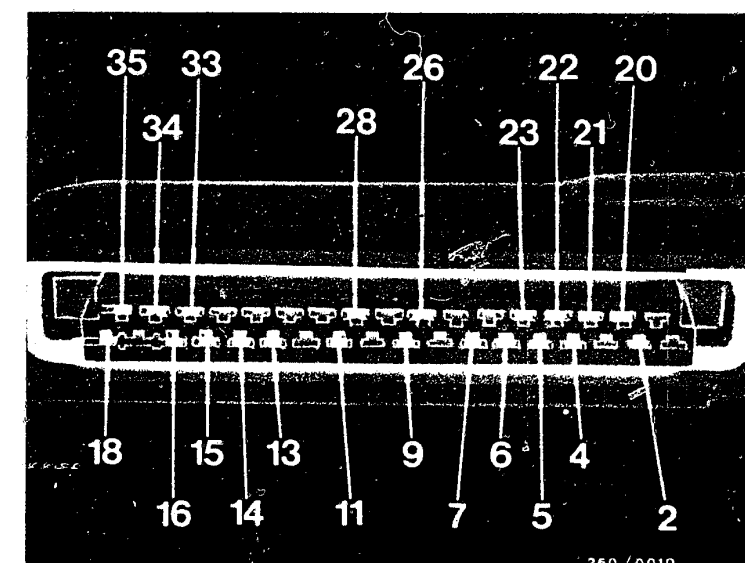
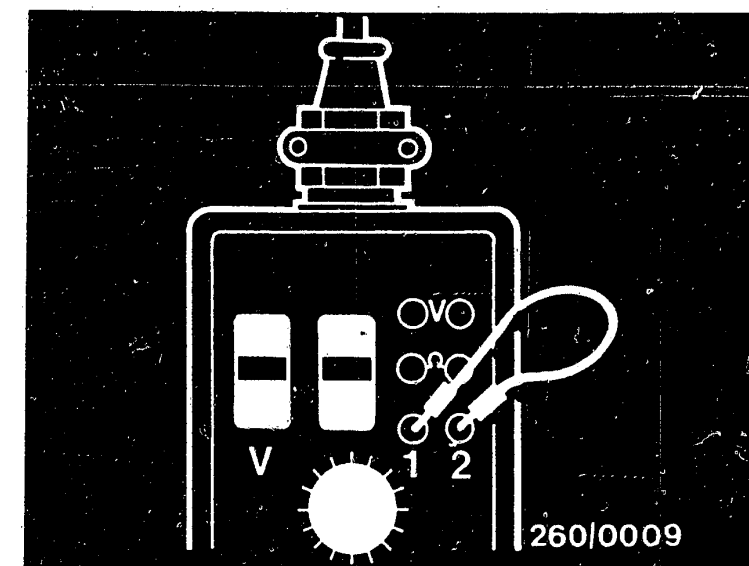


**B 13**

Test chart for universal test adapter  
BMW 316, 518



|   |  |   |
|---|--|---|
| <b>TEST STEP 1</b> <u>Switch off ignition. Disconnect wiring-harness plug from Ecotronic control unit. Connect socket 1 and socket 2 on universal test adapter (top picture).</u> |  |   |
| <u>Operation</u>  | <u>Reading</u>   | <u>Testing</u>  |
| Program switch "V" at position:   | <br><br>1 | Multimeter must indicate<br>greater than 1 M $\Omega$ .<br><br><br>If reading O.K., continue testing with <u>next test step</u> . |
| Program switch "Ω" at position  |  |   |
| Measuring equipment:<br>Multimeter (Ω range)  |  |   |
| Measuring range:<br>10 M $\Omega$   |  | Components:<br>Insulation resistance<br>Pre-throttle controller with lead   |
| Connection:<br>Test sockets blue  |  | Operation:<br>Insulation - term. 14, term. 15 and pre-throttle controller to ground (term. 5)                                     |
| Operation in vehicle:<br>Ignition off,<br>control unit not connected  |  | Malfunction:<br>Resistance $\leq$ 1 M $\Omega$  |



#### Trouble-shooting:

- Disconnect plug from pre-throttle controller.
- Disconnect control-unit plug from system adapter lead.
- Check term. 14/term. 15 on control-unit plug (centre picture) for short circuit to ground (set value > 1 M $\Omega$ )
- Check insulation resistance directly at pre-throttle controller (bottom picture).
- Check both plug-in contacts on pre-throttle controller plug to vehicle ground (set value > 1 M $\Omega$ )

Continued on B16/B17

**B14**

Test chart for universal test adapter  
BMW 316, 518



**B15**

Test chart for universal test adapter  
BMW 316, 518



## Trouble-shooting - test step 1 (continued)

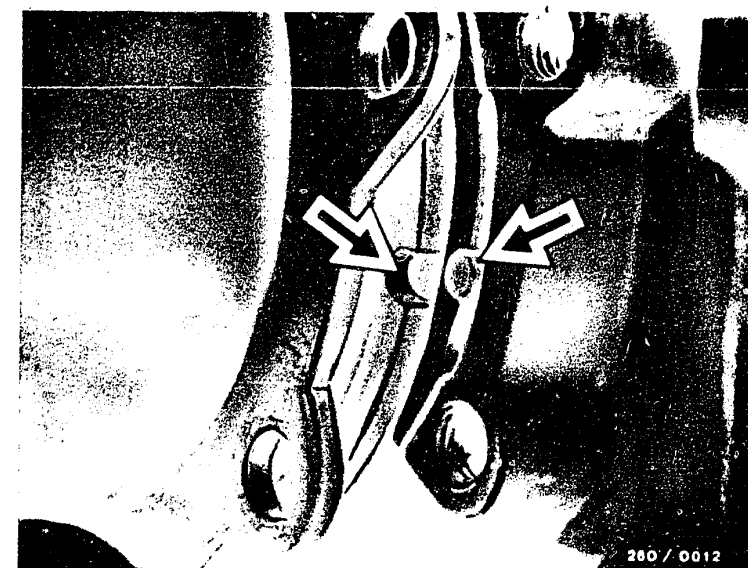
### Replacing the pre-throttle controller:

#### Removal:

- Unscrew air filter.
- Loosen 4 fastening screws of pre-throttle controller.

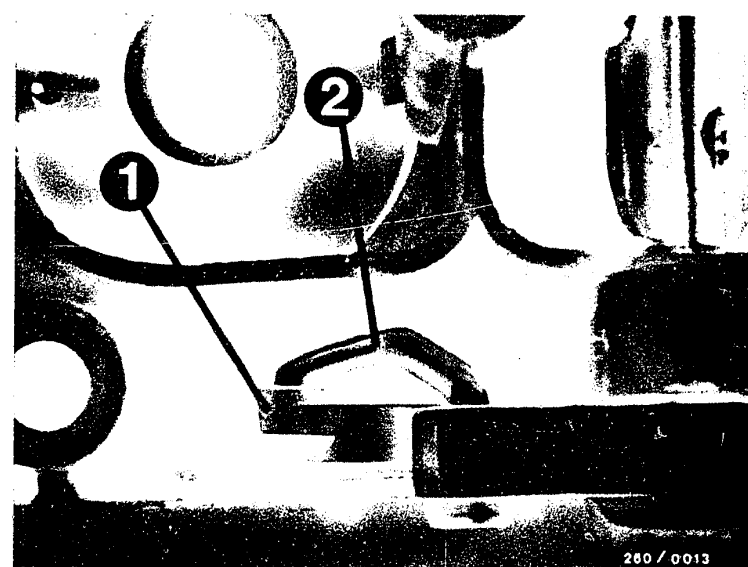
#### Installation:

When installing the pre-throttle controller, pay attention to its locating (top picture - arrows) as well as to the correct position of the lever (bottom picture - 1) when inserting the connecting rod (2).



Arrows = Locating

1 = Lever  
2 = Connecting rod



**B 16**

Test chart for universal test adapter  
BMW 316, 518



**B 17**

Test chart for universal test adapter  
BMW 316, 518

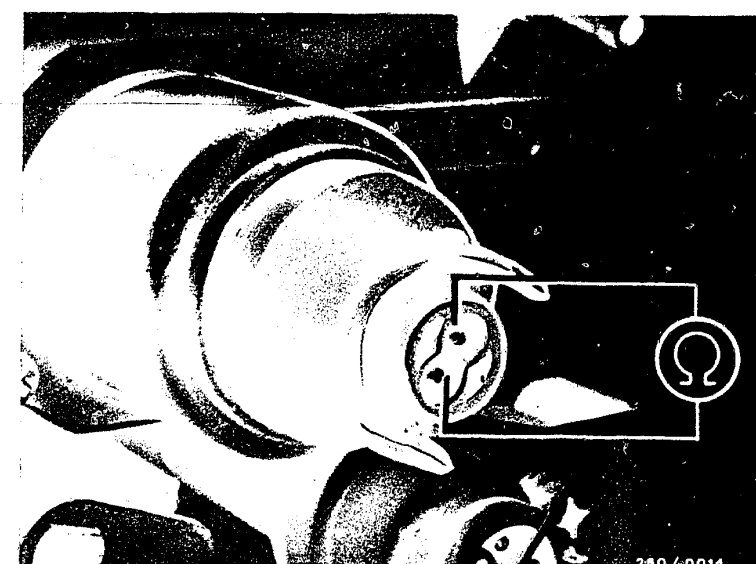
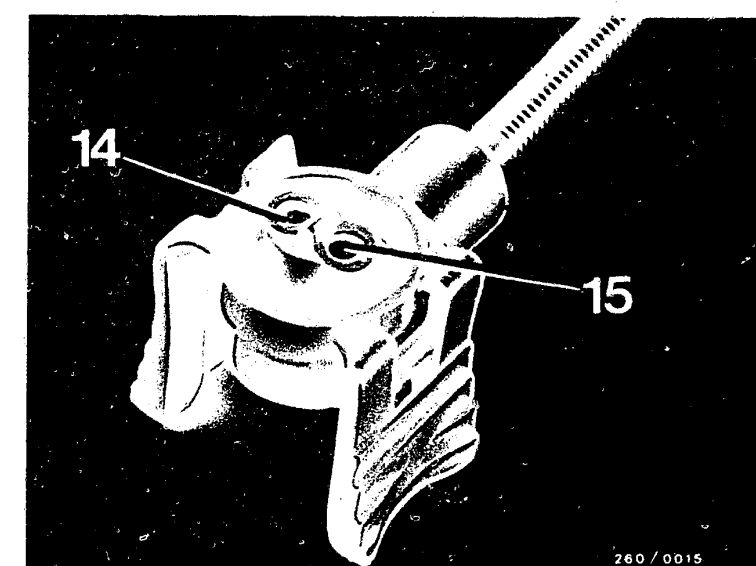
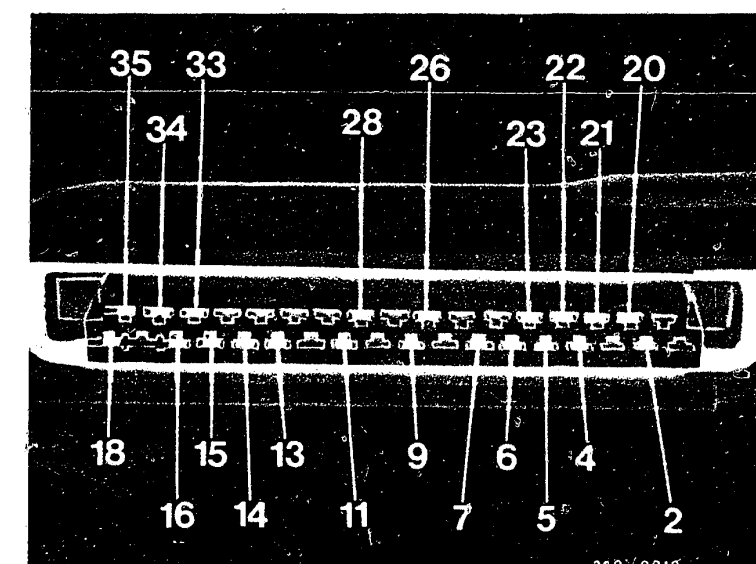


| TEST STEP 2   |   |   |  |
|---|---|---|--|
| Operation   |   | Reading   | Testing  |
| Program switch "V"<br>at position:                                  | ↓ | Multimeter must indicate<br>$< 10 \Omega$ .                                     | Component:<br>Pre-throttle controller                          |
| Program switch "Ω"<br>at position:                                  | 3 | (Measured value is influenced by protective resistor in universal test adapter) |  |
| Measuring equipment:<br>Multimeter (Ω range)                        |   |   | Operation:<br>Winding resistance between term. 14 and term. 15 |
| Measuring range:<br>x 1 Ω   |   | If reading O.K., continue testing with next test step.                          | Malfunction:<br>Resistance greater than 10 Ω                   |
| Connection:   |   |   |  |
| Test sockets blue   | Ω |   |  |
| Operation in vehicle:<br>Ignition off<br>Control unit not connected |   |   |  |

#### Trouble-shooting:

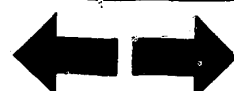
- Check plug-in connection: corrosion, loose contact.
- Test lead from control-unit plug term. 14 and term. 15 to pre-throttle controller plug (centre picture) for continuity (set value: approx. 0 Ω).
- Spring contacts on control-unit plug must not allow themselves to be pushed back.  
Repeat measurement directly at pre-throttle controller (bottom picture).  
Set value: 0.9 ... 1.7 Ω.  
If set value is not reached, replace pre-throttle controller.

Continued on B 20 / B 21



**B 18**

Test chart for universal adapter  
BMW 316, 518



**B 19**

Test chart for universal adapter  
BMW 316, 518



## Trouble-shooting - test step 2 (continued)

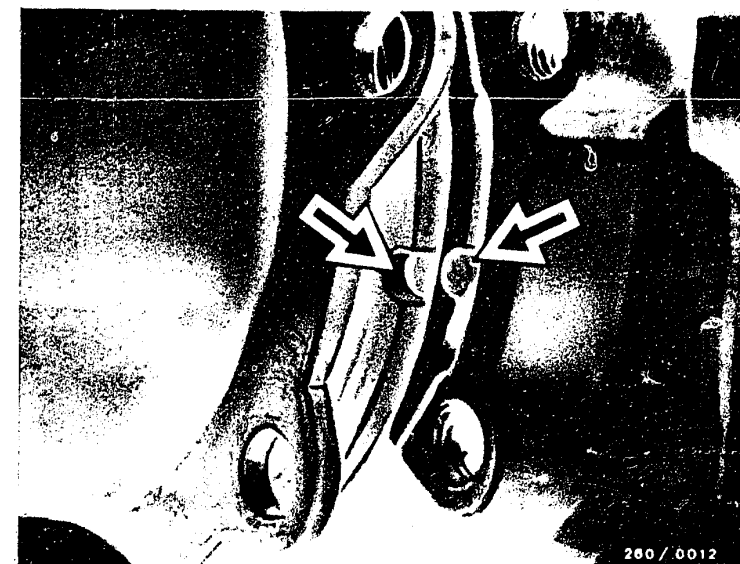
### Replacing the pre-throttle controller:

#### Removal:

- Unscrew air filter.
- Loosen 4 fastening screws of pre-throttle controller.

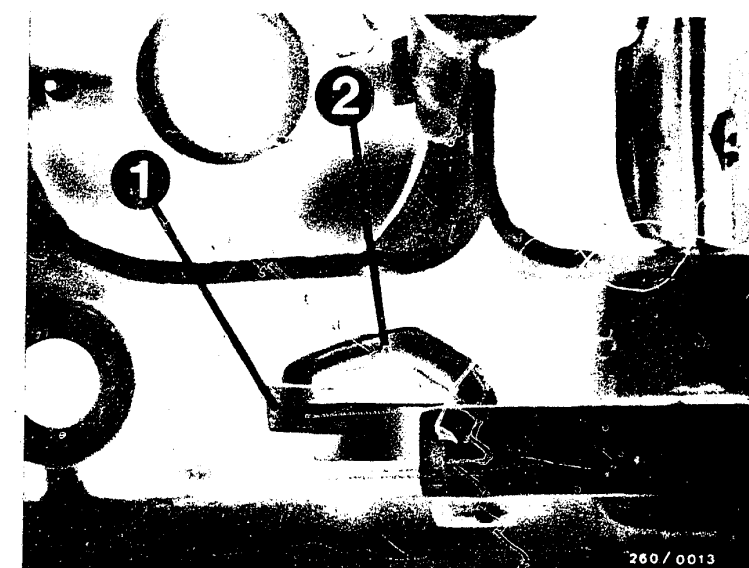
#### Installation:

When installing the pre-throttle controller, pay attention to its locating (top picture - arrows) as well as to the correct position of the lever (bottom picture - 1) when inserting the connecting rod (2).



Arrows - Locating

1 = Lever  
2 = Connecting rod



**B20**

Test chart for universal test adapter  
BMW 316, 518

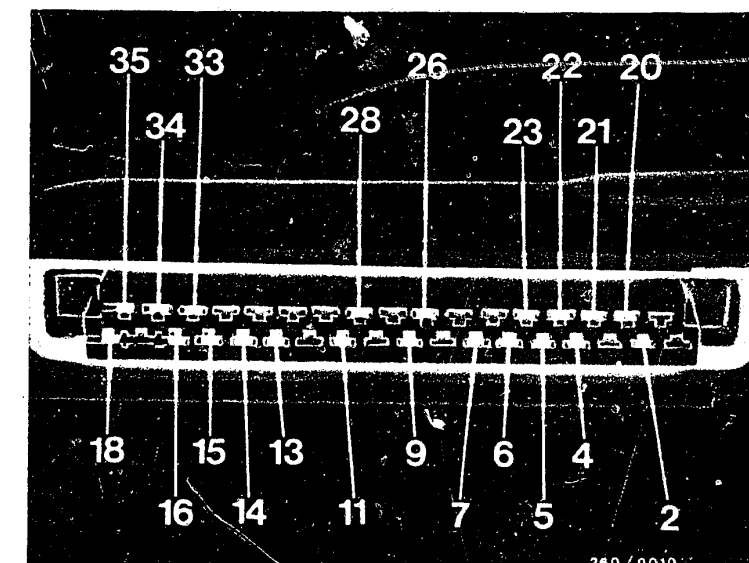


**B21**

Test chart for universal test adapter  
BMW 316, 518



| TEST STEP 3   |          |   |   |
|---|----------|---|---|
| Operation   |          | Reading   | Testing   |
| Program switch "V" at position:                                     | ↓        | Multimeter must indicate<br>less than 10 $\Omega$ .             | Component:<br>Ground lead<br>Pre-throttle controller                      |
| Program switch "Ω" at position:                                     | 6        |   |   |
| Measuring equipment:<br>Multimeter ( $\Omega$ range)                |          | If reading O.K.,<br>continue testing<br>with next test<br>step. | Operation:<br>Contact resistance between<br>term. 16 and ground (term. 5) |
| Measuring range:<br>x 1 $\Omega$                                    |          |   | Malfunction:<br>Resistance $\geq$ 10 $\Omega$                             |
| Connection:<br>Test sockets blue                                    | $\Omega$ |   |   |
| Operation in vehicle:<br>Ignition off<br>Control unit not connected |          |   |   |



Control-unit plug

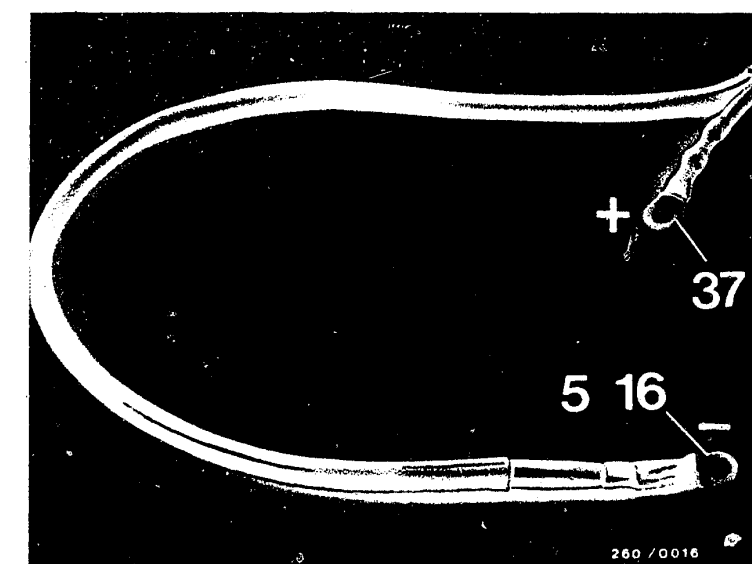
### Trouble-shooting:

For testing, disconnect control-unit plug from adapter lead.  
If necessary, use circuit diagram.  
Check plug connection: loose contact, corrosion, contacts must not allow themselves to be pushed back.

Test the following leads for continuity with ohmmeter:  
(Set value approx. 0  $\Omega$ ):

- From control-unit plug term. 16 to vehicle ground
- From control-unit plug term. 5 to vehicle ground

If set value is not reached, check whether ground terminal  
(negative pole of battery, bottom picture) has proper connection  
(corrosion).



**B22**

Test chart for universal adapter  
BMW 316, 518

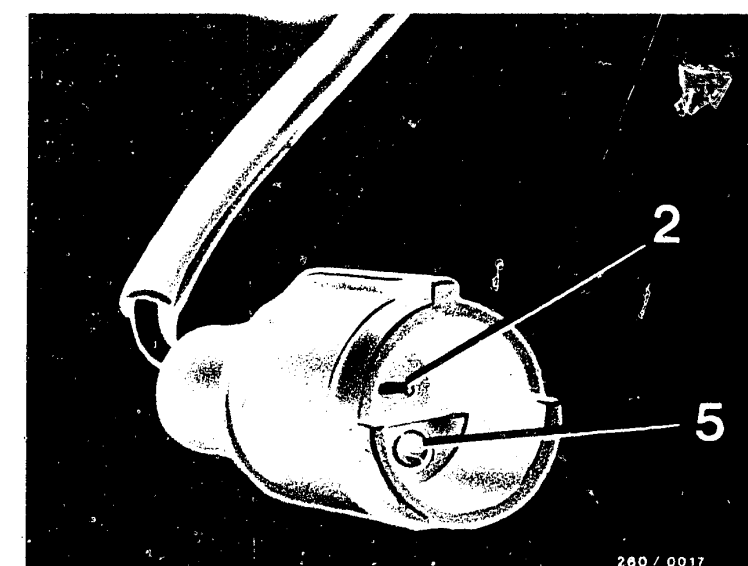
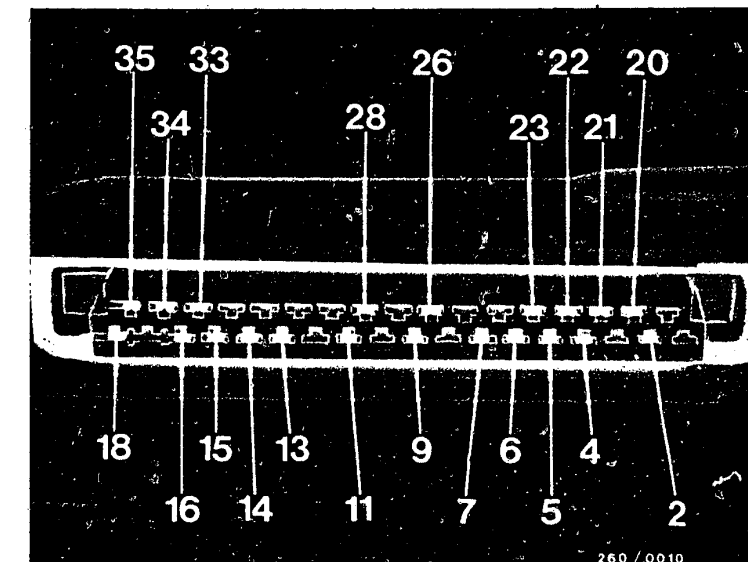


**B23**

Test chart for universal adapter  
BMW 316, 518



| TEST STEP 4   |   |   |  |
|---|---|---|--|
| Operation   |   | Reading   | Testing  |
| Program switch "V"<br>at position:  | ↓ | Multimeter must indicate<br><u>greater than 1 MΩ</u>                    | Component:<br>Idle switch  |
| Program switch "Ω"<br>at position:  | 8 |   |  |
| Measuring equipment:<br>Multimeter (Ω range)  |   |   | Operation:<br>Idle switch open.<br>No connection between term. 2<br>and ground (term. 5) |
| Measuring range:<br>10 M Ω  |   | If reading O.K.,<br>continue testing<br>with <u>next test<br/>step.</u> | Malfunction:<br>Idle switch not opening.   |
| Connection:<br>Test sockets blue  | Ω |   |  |
| Operation in vehicle:<br>Ignition off.<br>Control unit not connected.<br>Accelerator in idle position |   |   |  |



#### Trouble-shooting:

For testing, disconnect control-unit plug (top picture) from adapter lead and disconnect plug from idle switch (bottom picture) on throttle-valve positioner. If necessary, use circuit diagram.

Test the following leads with ohmmeter (set value ∞ Ω):

- From term. 2 (control-unit plug to term. 5 (ground).
- Check whether idle-stop screw is pressing on idle switch. (If not, press on idle switch by hand) and measure directly at idle switch (plug).

If set value is not reached, replace complete throttle-valve positioner.

Continued on C 3 / C 4

**C1**

Test chart for universal adapter  
BMW 316, 518



**C2**

Test chart for universal adapter  
BMW 316, 518





## Trouble-shooting - test step 4 (continued)

### Replacing the throttle-valve positioner:

Disconnect all plugs from carburetor.  
Remove carburetor.  
Loosen fastening nuts (3 pieces) and remove throttle-valve positioner.  
Replace idle-stop screw (bottom picture - 3).  
Install new throttle-valve positioner and mount carburetor.  
Connect all plugs to carburetor.

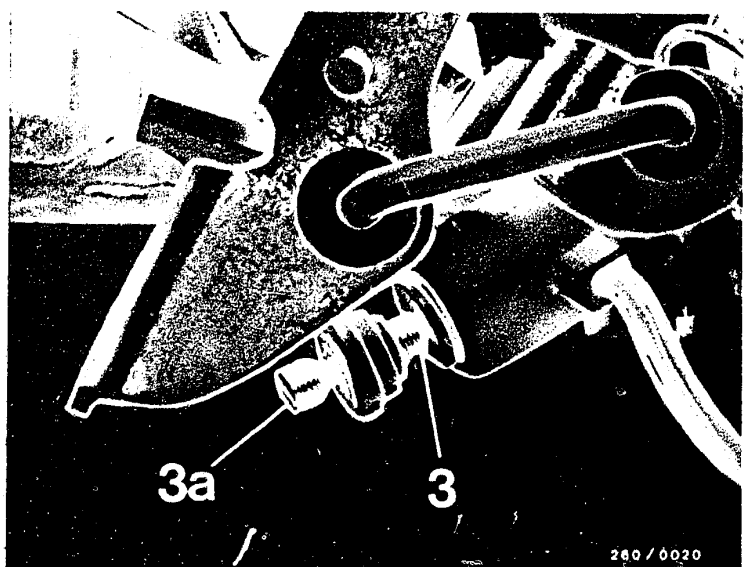
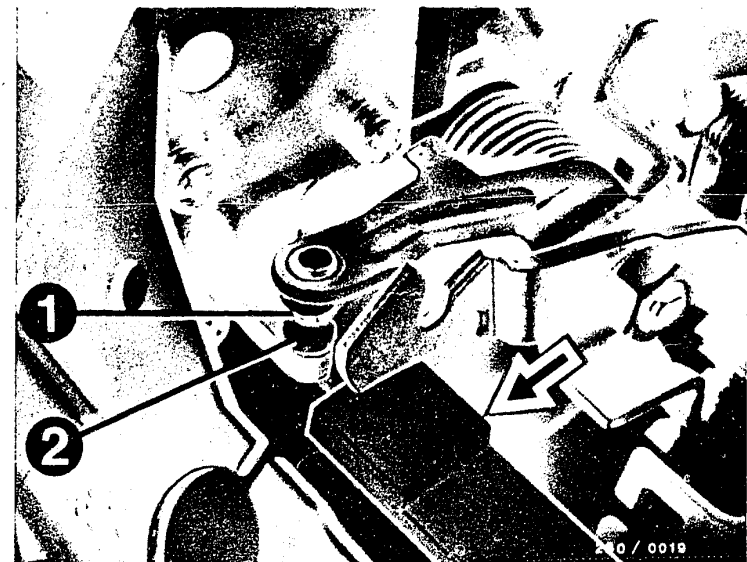
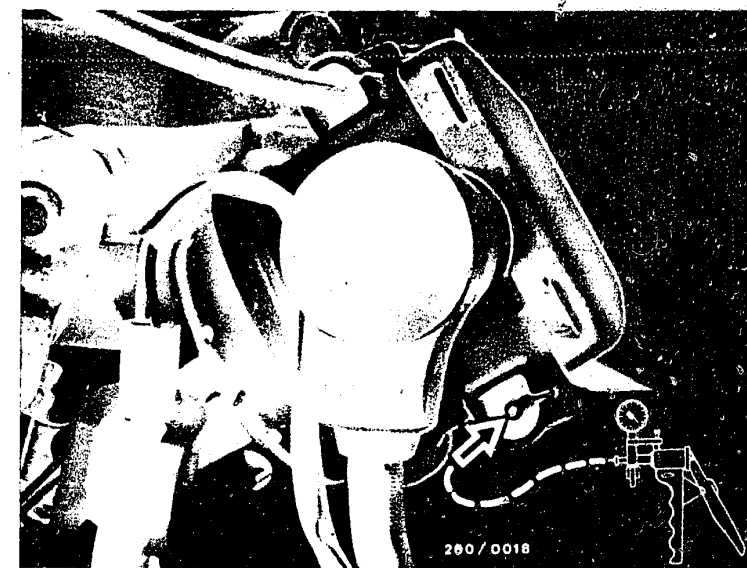
### Adjusting the throttle-valve part:

Connect Y-adapter lead to control unit.  
Switch on ignition.  
Connect vacuum pump to evacuating valve (see top picture) and constantly produce a pressure difference (approx. 250 mbar) while adjusting.

Constantly press button T 6 on universal test adapter while adjusting or short-circuit plug of temperature sensor (simulation of engine at operating temperature - ram of throttle-valve positioner moves into position-regulated position).

In this position the feeler gauge (6.84 mm) must be able to slide between throttle-valve stop screw (centre picture - 1) and stop (2).  
Adjust with new idle-stop screw (tear-off screw - bottom picture - 3).

Break off head (3a) of idle-stop screw.  
Re-establish hose connections.  
Switch off ignition.  
Remove Y-adapter lead from control unit.



**C3**

Test chart for universal test adapter  
BMW 316, 518

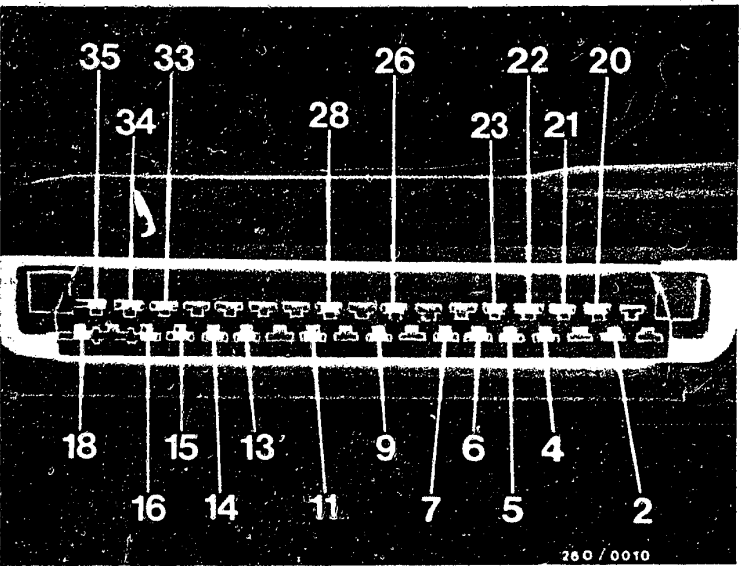


**C4**

Test chart for universal test adapter  
BMW 316, 518



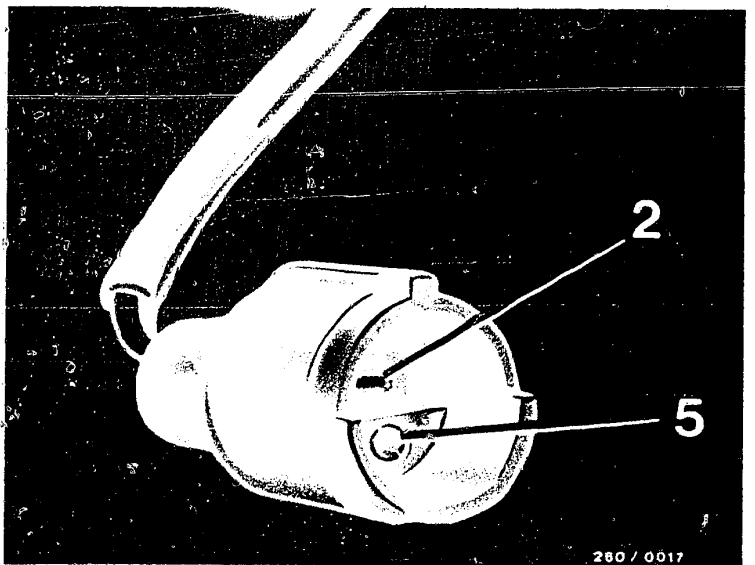
| TEST STEP 5  |          |  |   |
|--|----------|--|---|
| Operation  |          | Reading  | Testing   |
| Program switch "V" at position:  | ↓        | Multimeter must indicate<br>less than 60 $\Omega$ .<br><br>(Measured value is influenced by protective resistor in universal test adapter) | Component:<br>Idle switch with lead   |
| Program switch " $\Omega$ " at position:   | 8        |  |   |
| Measuring equipment:<br>Multimeter ( $\Omega$ range)   |          |  | Operation:<br>Contact resistance between idle switch term. 2 and ground (term. 5) |
| Measuring range:<br>x 1 $\Omega$   |          |  |   |
| Connection:  |          | If reading O.K., continue testing with <u>next test step</u> .   | Malfunction:<br>Resistance $\geq 60 \Omega$                                       |
| Test sockets blue  | $\Omega$ |  |   |
| Operation in vehicle:<br>Ignition off<br>Control unit not connected<br>Accelerator in part-load position |          |  |   |



Trouble-shooting:

- Check plug-in connection (corrosion, loose contact).
- Test lead from control-unit plug term. 2 and term. 5 to idle switch plug (connector) (bottom picture) for continuity. Spring contacts on control-unit plug must not allow themselves to be pushed back. Make measurement directly at idle-switch plug:  
Set value in part-load position: < 50  $\Omega$

If set value is not reached, replace complete throttle-valve positioner.



Continued on C 7 / C 8

## Trouble-shooting - test step 5 (continued)

### Replacing the throttle-valve positioner:

Disconnect all plugs from carburetor.

Remove carburetor.

Loosen fastening nuts (3 pieces) and remove throttle-valve positioner.

Replace idle-stop screw (bottom picture - 3).

Install new throttle-valve positioner and mount carburetor.

Connect all plugs to carburetor.

### Adjusting the throttle-valve part:

Connect Y-adapter lead to control unit.

Switch on ignition.

Connect vacuum pump to evacuating valve (see top picture) and constantly produce a pressure difference (approx. 250 mbar) while adjusting.

Constantly press button T 6 on universal test adapter while adjusting or short-circuit plug of temperature sensor (simulation of engine at operating temperature - ram of throttle-valve positioner moves into position-regulated position).

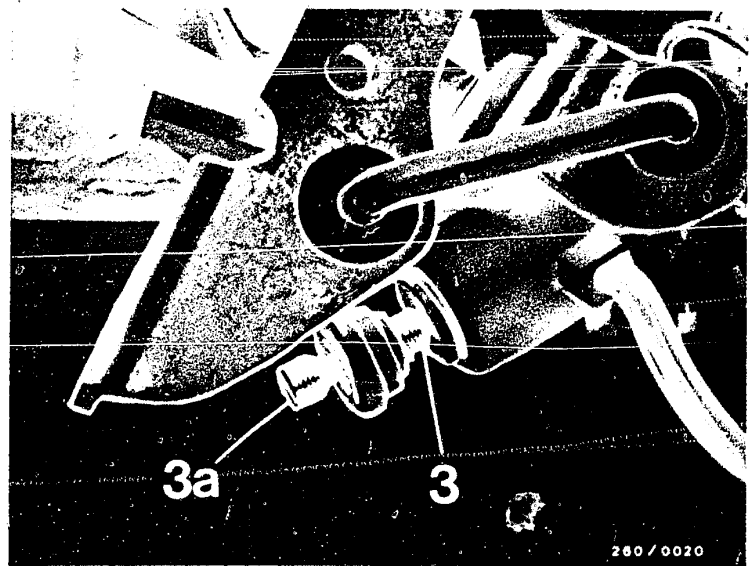
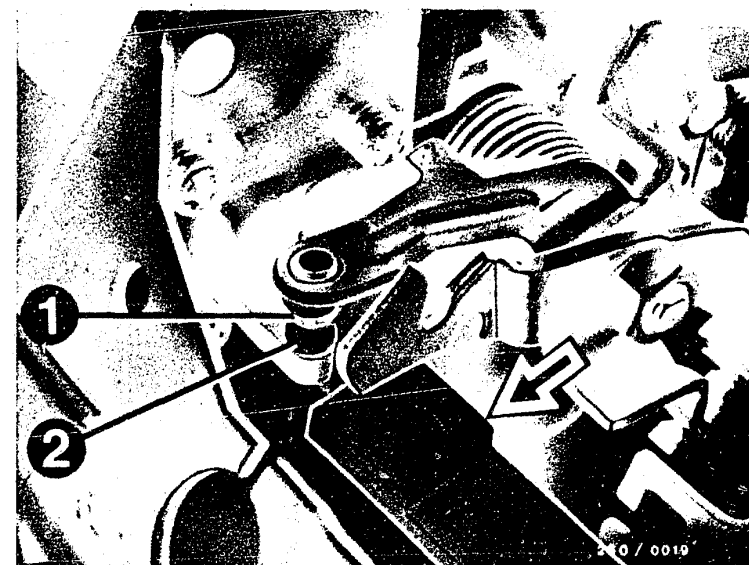
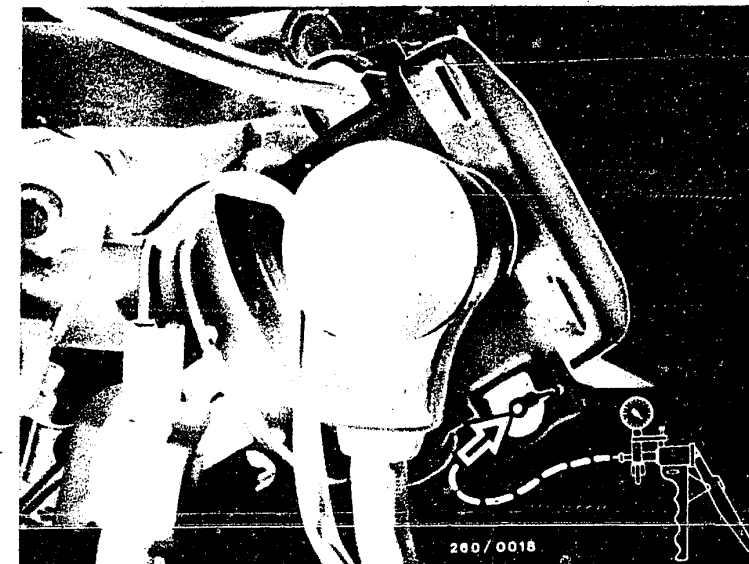
In this position the feeler gauge (6.84 mm) must be able to slide between throttle-valve stop screw (centre picture - 1) and stop (2). Adjust with new idle-stop screw (tear-off screw - bottom picture - 3).

Break off head (3a) of idle-stop screw.

Re-establish hose connections.

Switch off ignition.

Remove Y-adapter lead from control unit.



**C7**

Test chart for universal test adapter  
BMW 316, 518



**C8**

Test chart for universal test adapter  
BMW 316, 518



## TEST STEP 6

### Operation

Program switch "V"  
at position:



Program switch "Ω"  
at position:

10

Measuring equipment:

Multimeter (Ω range)

Measuring range:

x 10 Ω

Connection:

Test sockets blue

Ω

Operation in vehicle:

Ignition off

Control unit not connected

### Reading

Measured value  
depends on  
temperature

at 20°C: 2 kΩ...3kΩ

at 80°C: 280Ω...360Ω

(engine at opera-  
ting temperature)

If reading O.K.,  
continue testing  
with next test  
step.

### Testing

Component:

Intake manifold temperature  
sensor (NTC)

Operation:

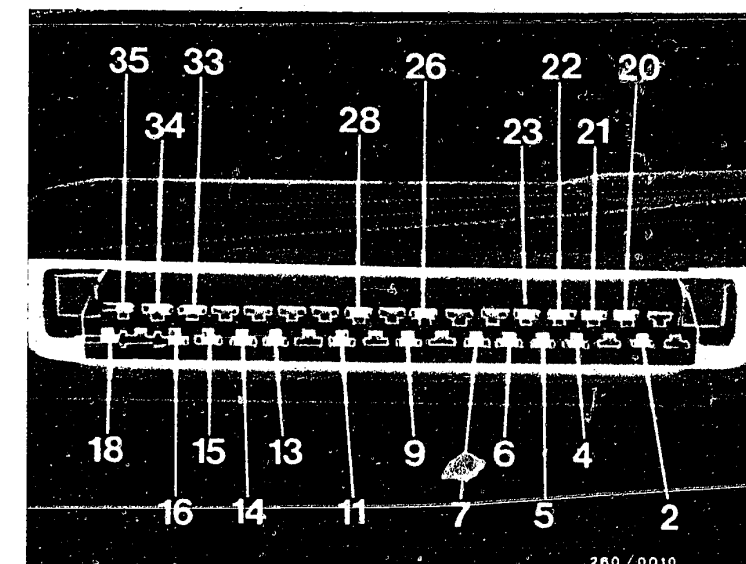
Resistance between term. 22  
and term. 23

Malfunction:

Resistance outside tolerance  
(note temperature)

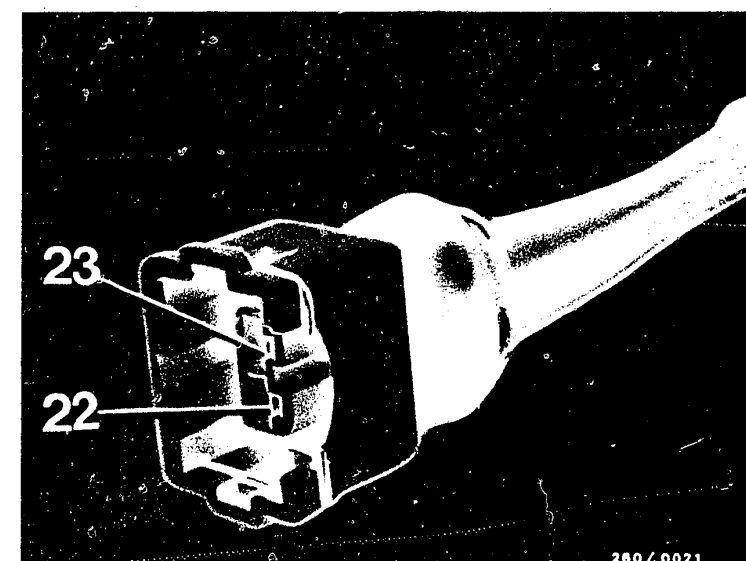
### Trouble-shooting:

- Disconnect plug from temperature sensor and make direct resistance measurement. Replace temperature sensor if necessary.
- Check spring contacts on plug; they must not allow themselves to be pushed back.
- Check leads from temperature sensor plug to control unit plug term. 22 and term. 23.



Control-unit plug

Plug for temperature  
sensor



C9

Test chart for universal adapter

BMW 316, 518



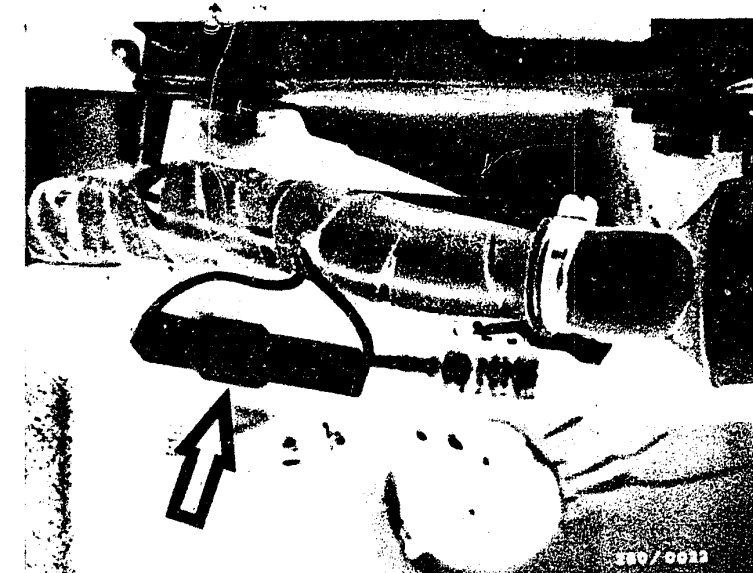
C10

Test chart for universal adapter

BMW 316, 518



| TEST STEP 7   |    |   |  |
|---|----|---|--|
| Operation   |    | Reading   | Testing  |
| Program switch "V"<br>at position:                                  | ↓  | Term. 13 can be connected to ground (term. 5) for engine-speed increase.<br>(Above glove compartment, on wiring harness) then reading<br><br>$< 10 \Omega$<br><br>No engine-speed increase:<br><br>$> 1 M \Omega$ | Component:<br>Engine-speed increase              |
| Program switch "Ω"<br>at position:                                  | 11 |   | Operation:<br>Measurement of term. 13 to term. 5 |
| Measuring equipment:<br>Multimeter (Ω range)                        |    |   |  |
| Measuring range:<br>Ω/M Ω   |    | If reading O.K., continue testing with <u>next test step</u> .  | Malfunction:<br>---                              |
| Connection:   |    |   |  |
| Test sockets blue   | Ω  |   |  |
| Operation in vehicle:<br>Ignition off<br>Control unit not connected |    |   |  |



The plug-in connection (arrow) may be established for engine-speed increase from  $800 \pm 50 \text{ min}^{-1}$  to  $900 \pm 50 \text{ min}^{-1}$ .

#### Trouble-shooting:

If idle-speed increase to  $900 \text{ min}^{-1}$  not possible:

- Disconnect control-unit plug from adapter lead.
- On control-unit plug check whether term. 13 is connected to ground (term. 5). Plugs must be plugged together.
- If ground is connected to control-unit plug term. 13 and if there is no engine-speed increase, replace control unit.
- Test lead term. 13 from control-unit plug to plug for continuity.

**C11**


Test chart for universal adapter  
BMW 316, 518

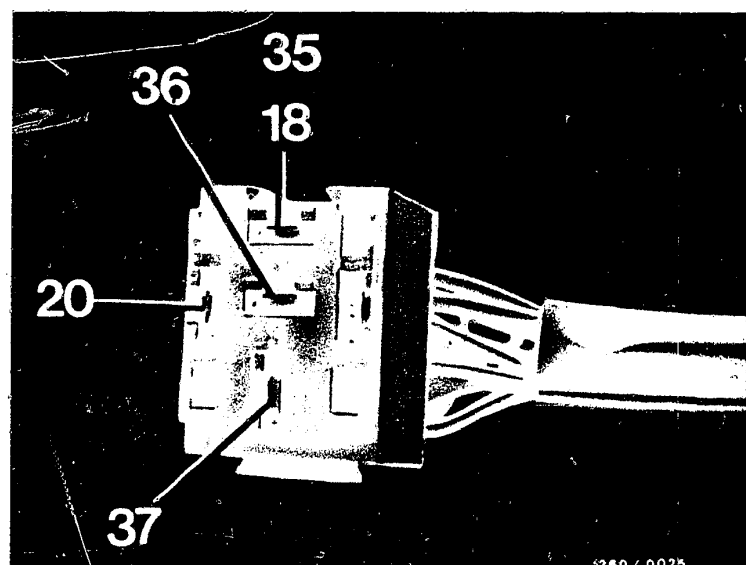
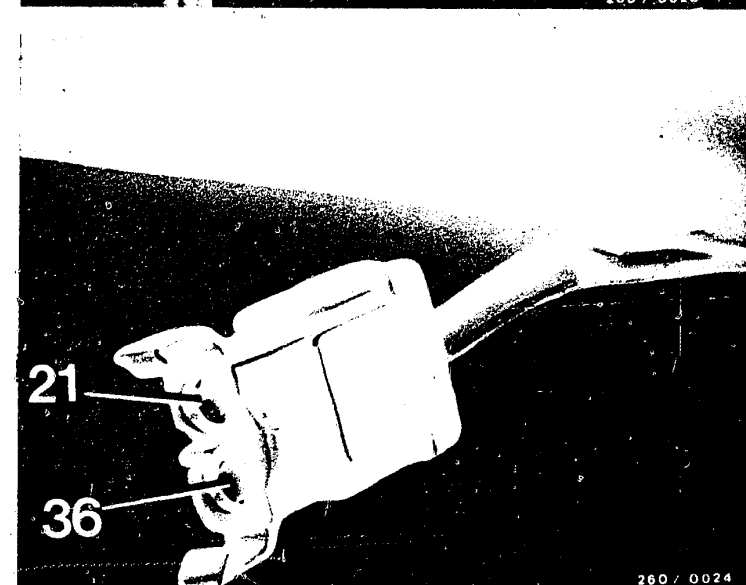
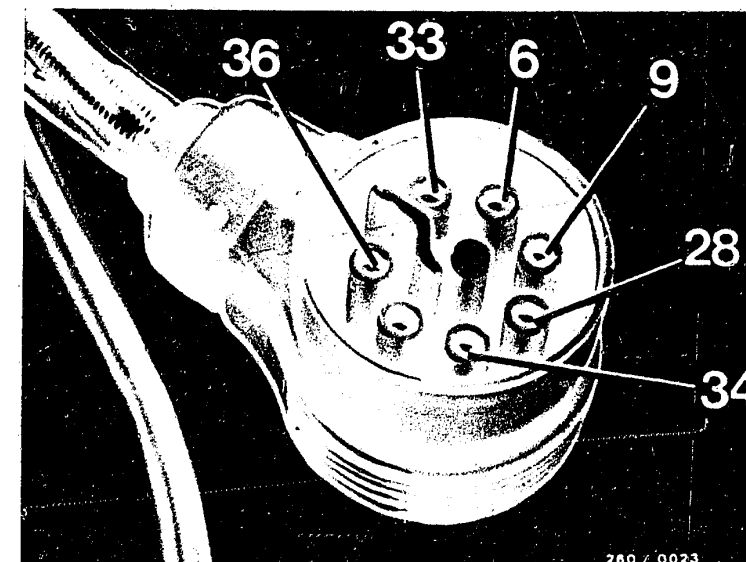


**C12**

Test chart for universal adapter  
BMW 316, 518



| TEST STEP 8   |   |  |   |
|---|---|--|---|
| Operation   |   | Reading  | Testing   |
| Program switch "V"<br>at position:                                  |  | Multimeter must indicate<br><br>> 1 MΩ.  | Component:<br>Insulation resistance<br>Solenoid-operated valves |
| Program switch "Ω"<br>at position:                                  | 13  |  |   |
| Measuring equipment:<br>Multimeter (Ω range)                        |   | If set value not reached, before trouble-shooting change over the connections on the multimeter.<br>If set value now reached, test is O.K. | Operation:<br>Insulation between term. 21 and ground (term. 5)  |
| Measuring range:<br>M Ω   |   |  |   |
| Connection:<br>Test sockets blue                                    | Ω   |  |   |
| Operation in vehicle:<br>Ignition off<br>Control unit not connected |   | Continue testing with <u>next test step</u> .  | Malfunction:<br>Resistance ≤ 1 MΩ                               |



#### Trouble-shooting:

- Disconnect control-unit plug from adapter lead. Disconnect plug from throttle-valve positioner (top picture) and ignition-control valve (centre picture). Disconnect control relay. If necessary, use circuit diagram.

Perform measurements consecutively, in each case to ground (term. 5 on control-unit plug) (set value: > 1 MΩ):

- From control-unit plug term. 21 or ignition-control valve plug term. 21.
- From control-unit plug term. 18/term. 35 or control-relay base (bottom picture) term. 18/term. 35.
- From control-unit plug term. 33 or throttle-valve positioner plug term. 33.
- From control-unit plug term. 34 or throttle-valve positioner plug term. 34.
- From throttle-valve positioner plug/ignition-control valve term. 36 or control relay base term. 36.

**C13**


Test chart for universal adapter  
BMW 316, 518

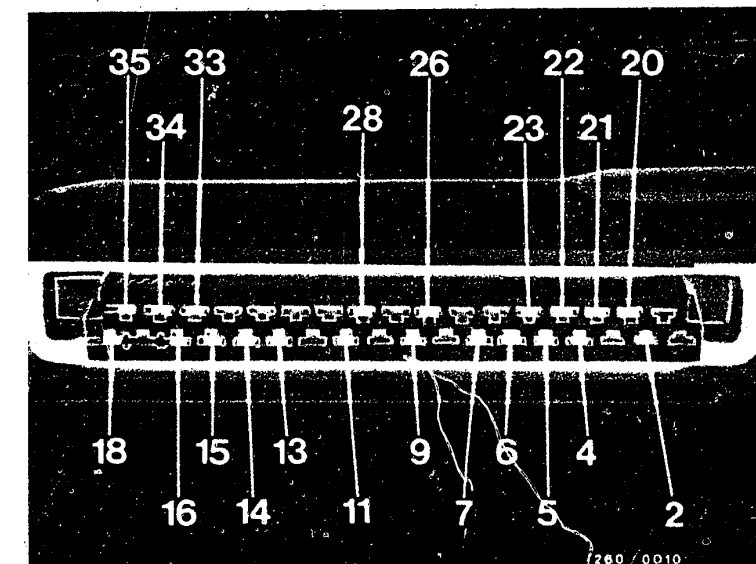


**C14**

Test chart for universal adapter  
BMW 316, 518

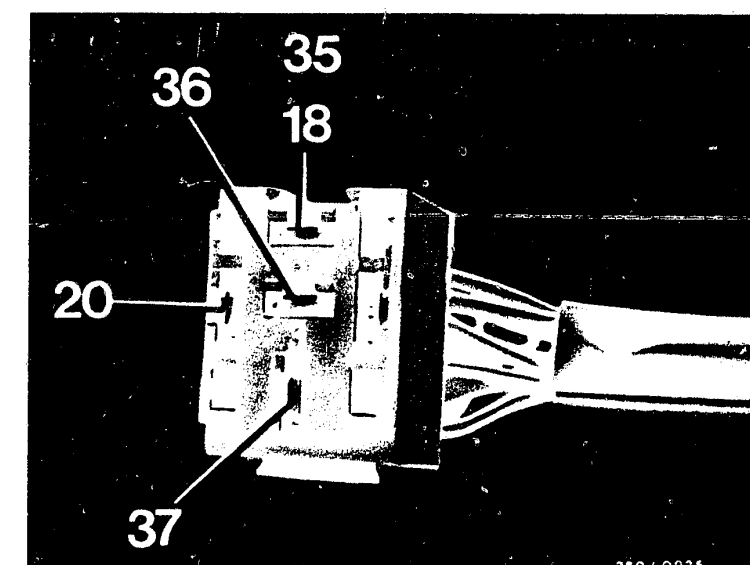


| TEST STEP 9  |   |   |  |
|--|---|---|--|
| Operation  |   | Reading   | Testing  |
| <u>Program switch "V"</u><br><u>at position:</u>                             |  | Multimeter must indicate<br><br><10 Ω.<br><br>(Measured value is influenced by protective resistor in universal test adapter)<br><br><br>If reading O.K., continue testing with <u>next test step</u> . | <u>Component:</u><br><br>Voltage supply<br>(positive lead for throttling-orifice actuator) |
| <u>Program switch "Ω"</u><br><u>at position:</u>                             | 16  |   | <u>Operation:</u><br><br>Resistance between term. 18 and term. 35<br><br>< 10 Ω            |
| <u>Measuring equipment:</u><br>Multimeter (Ω range)                          |   |   |  |
| <u>Measuring range:</u><br>x 1 Ω   |   |   |  |
| <u>Connection:</u><br>Test sockets blue                                      | Ω   |   | <u>Malfunction:</u><br><br>Resistance > 10 Ω   |
| <u>Operation in vehicle:</u><br>Ignition off.<br>Control unit not connected. |   |   |  |



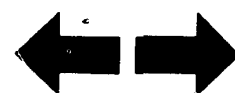
#### Trouble-shooting:

- Disconnect control-unit plug from adapter lead.
- Check spring contacts on plug (they must not allow themselves to be pushed back).
- Disconnect relay and test leads for continuity from terminal 18/35 (see bottom picture) to term. 18/35 on control-unit plug (set value: approx.  $0 \Omega$ ) (If necessary, use circuit diagram).



**C15**

Test chart for universal adapter  
BMW 316, 518



**C16**

Test chart for universal adapter  
BMW 316, 518



| TEST STEP 10  |    |   |   |
|---|----|---|---|
| Operation   |    | Reading   | Testing   |
| Program switch "V" at position:                                       | ↓  | Multimeter must indicate<br>$40\ \Omega \dots 100\ \Omega$ .<br><br>(Measured value is influenced by protective resistor in universal test adapter)<br><br>If reading O.K., continue testing with <u>next test step</u> . | <u>Component:</u><br>Solenoid-operated valve (evacuating)             |
| Program switch "Ω" at position:                                       | 17 |   | <u>Operation:</u><br>Winding resistance between term. 33 and term. 35 |
| Measuring equipment:<br>Multimeter (Ω range)                          |    |   | <u>Malfunction:</u><br>Resistance outside tolerance                   |
| Measuring range:<br>x 1 Ω   |    |   |   |
| Connection:<br>Test sockets blue                                      | Ω  |   |   |
| Operation in vehicle:<br>Ignition off.<br>Control unit not connected. |    |   |   |

#### Trouble-shooting:

For testing, disconnect control-unit plug from adapter lead and disconnect plug from throttle-valve positioner. If necessary, use circuit diagram.

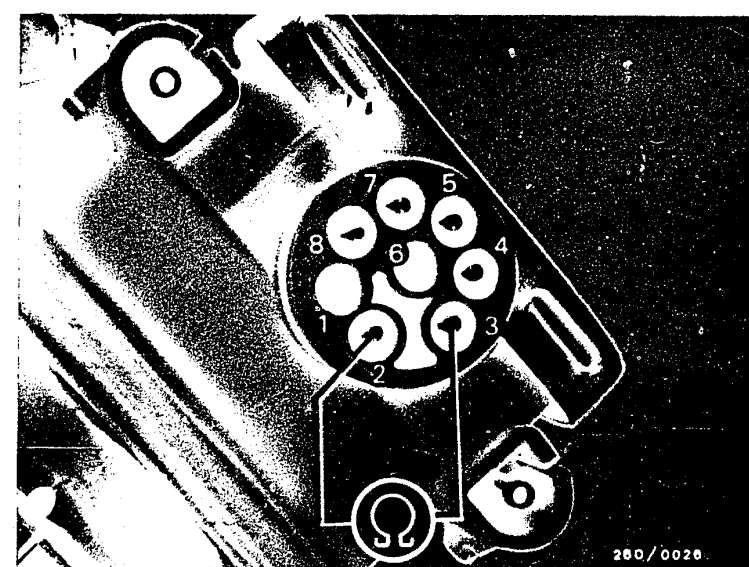
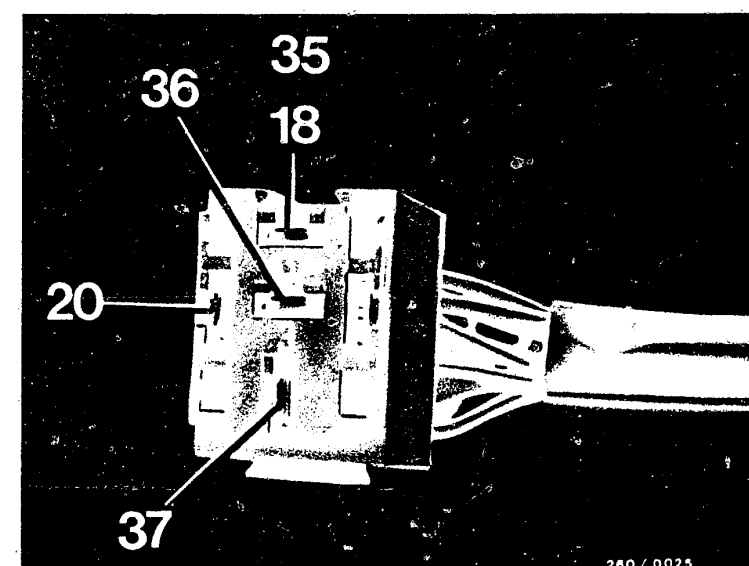
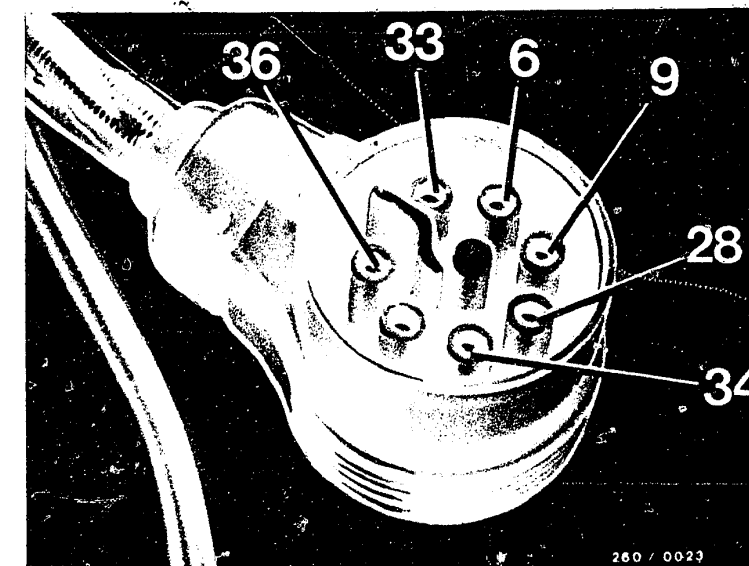
Check plug-in connections: corrosion, loose contact (spring contacts must not allow themselves to be pushed back).

#### Test the following leads for continuity:

- Leads from throttle-valve positioner plug, receptacle 33 (top picture) to control-unit plug term. 33.
- Receptacle 36 to relay base 36 (centre picture). From relay base to control-unit plug term. 35.
- Check relay plug-in base (corrosion). Make direct resistance measurement at throttle-valve positioner. Set value terminal 2 against terminal 3:  $35 \dots 80\ \Omega$  (bottom picture).

If test specification not reached, replace complete throttle-valve positioner.

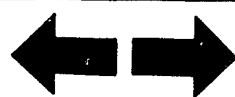
Continued on C 19 / C 20



**C17**

Test chart for universal adapter

BMW 316, 518



**C18**

Test chart for universal adapter

BMW 316, 518





## Trouble-shooting - test step 10 (continued)

### Replacing the throttle-valve positioner:

Disconnect all plugs from carburetor.

Remove carburetor.

Loosen fastening nuts (3 pieces) and remove throttle-valve positioner.

Replace idle-stop screw (bottom picture - 3).

Install new throttle-valve positioner and mount carburetor.

Connect all plugs to carburetor.

### Adjusting the throttle-valve part:

Connect Y-adapter lead to control unit.

Switch on ignition.

Connect vacuum pump to evacuating valve (see top picture) and constantly produce a pressure difference (approx. 250 mbar) while adjusting.

Constantly press button T 6 on universal test adapter while adjusting or short-circuit plug of temperature sensor (simulation of engine at operating temperature - ram of throttle-valve positioner moves into position-regulated position).

In this position the feeler gauge (6.84 mm) must be able to slide between throttle-valve stop screw (centre picture - 1) and stop (2).

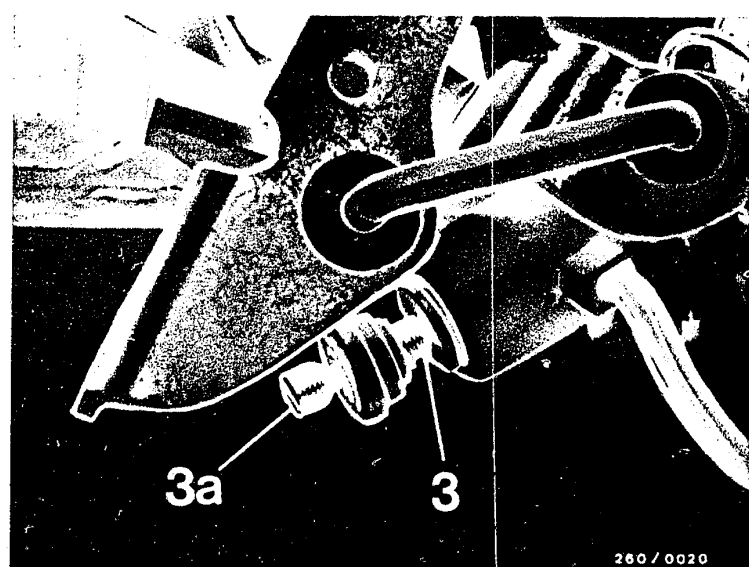
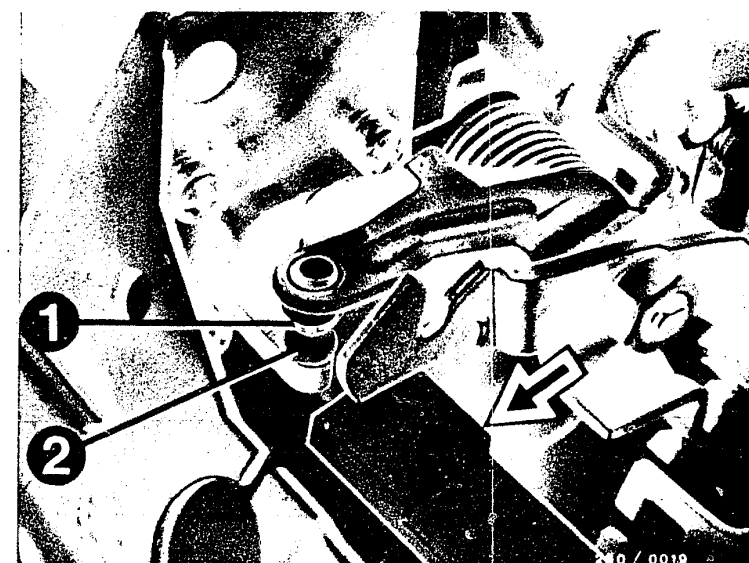
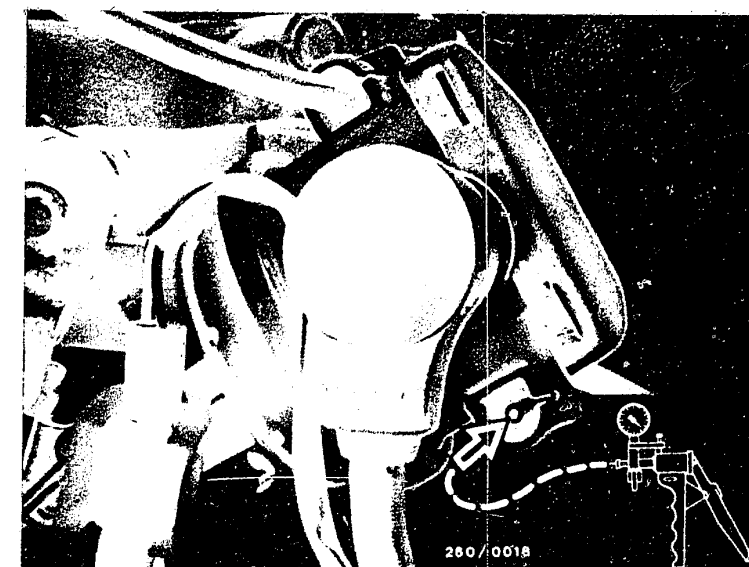
Adjust with new idle-stop screw (tear-off screw - bottom picture - 3).

Break off head (3a) of idle-stop screw.

Re-establish hose connections.

Switch off ignition.

Remove Y-adapter lead from control unit.



**C19**

Test chart for universal test adapter

BMW 316, 518



**C20**

Test chart for universal test adapter

BMW 316, 518



| TEST STEP 11  |    |   |  |
|---|----|---|--|
| Operation   |    | Reading   | Testing  |
| Program switch "V" at position:                                       | ↓  | Multimeter must indicate<br><u>40 Ω...100 Ω.</u>                                | Component:<br>Solenoid-operated valve (pressurizing)           |
| Program switch "Ω" at position:                                       | 18 | (Measured value is influenced by protective resistor in universal test adapter) | Operation:<br>Winding resistance between term. 34 and term. 35 |
| Measuring equipment:<br>Multimeter (Ω range)                          |    |   | Malfunction:<br>Resistance outside tolerance                   |
| Measuring range:<br>x 1 Ω   |    |   |  |
| Connection:<br>Test sockets blue                                      | Ω  | If reading O.K., continue testing with <u>next test step.</u>                   |  |
| Operation in vehicle:<br>Ignition off.<br>Control unit not connected. |    |   |  |

#### Trouble-shooting:

For testing, disconnect control-unit plug from adapter lead and disconnect plug from throttle-valve positioner. If necessary, use circuit diagram.

Check plug-in connections: corrosion, loose contact (spring contacts must not allow themselves to be pushed back).

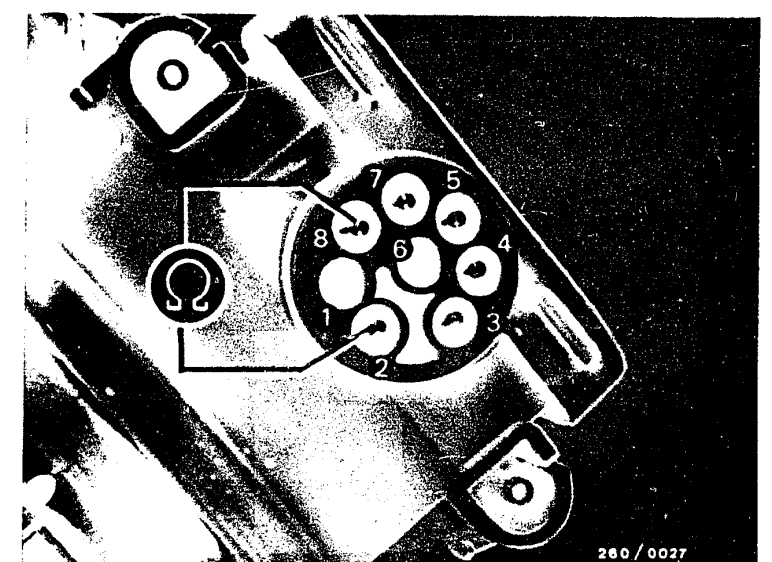
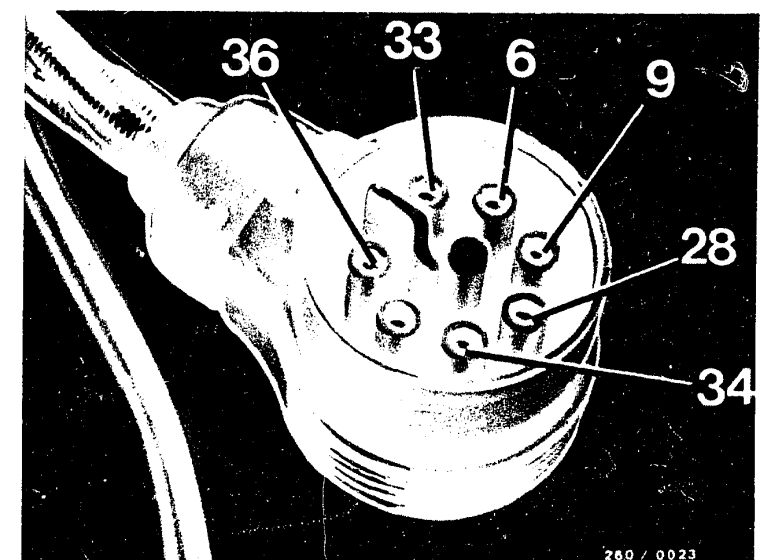
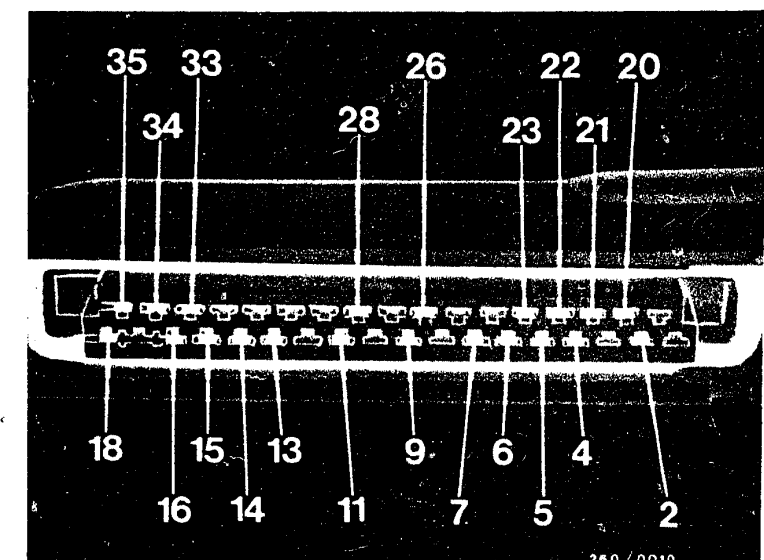
Test lead from throttle-valve positioner plug receptacle 34 (centre picture) to control-unit plug term. 34 for continuity.

Make direct resistance measurement at throttle-valve positioner (terminal 2 against terminal 8 - bottom picture).

Set value: 35 ... 80 Ω.

If set value not reached, replace complete throttle-valve positioner.

Continued on C 23 / C 24



**C21**

Test chart for universal adapter

BMW 316, 518



**C22**

Test chart for universal adapter

BMW 316, 518



## Trouble-shooting - test step 11 (continued)

### Replacing the throttle-valve positioner:

Disconnect all plugs from carburetor.  
Remove carburetor.  
Loosen fastening nuts (3 pieces) and remove throttle-valve positioner.  
Replace idle-stop screw.  
Install new throttle-valve positioner and mount carburetor.  
Connect all plugs to carburetor.

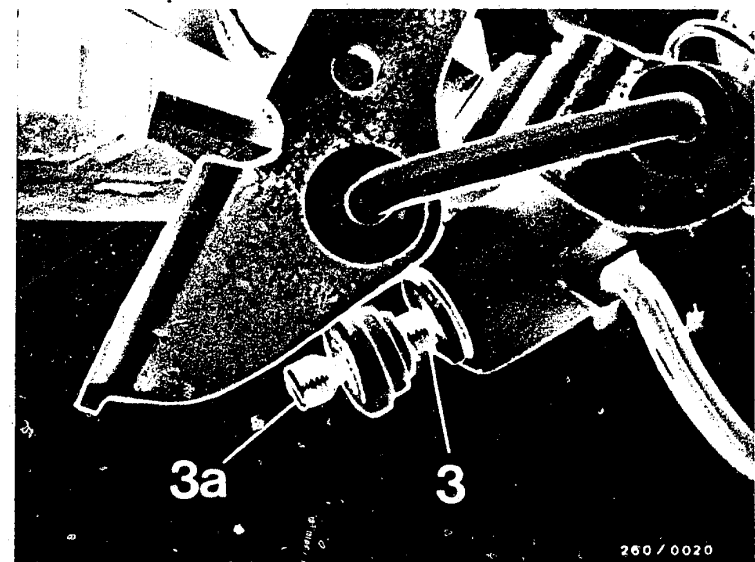
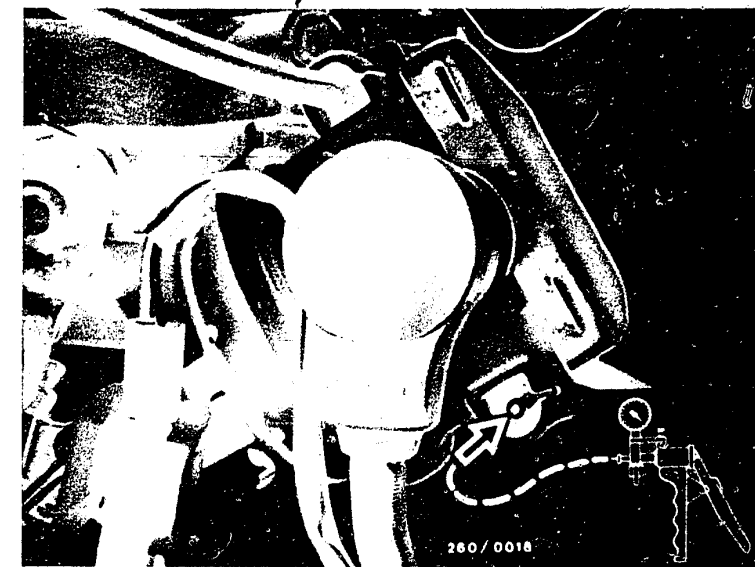
### Adjusting the throttle-valve part:

Connect Y-adapter lead to control unit.  
Switch on ignition.  
Connect vacuum pump to evacuating valve (see top picture) and constantly produce a pressure difference (approx. 250 mbar) while adjusting.

Constantly press button T 6 on universal test adapter while adjusting or short-circuit plug of temperature sensor (simulation of engine at operating temperature - ram of throttle-valve positioner moves into position-regulated position).

In this position the feeler gauge (6.84 mm) must be able to slide between throttle-valve stop screw (centre picture - 1) and stop (2).  
Adjust with new idle-stop screw (tear-off screw - bottom picture - 3).

Break off head (3a) of idle-stop screw.  
Re-establish hose connections.  
Switch off ignition.  
Remove Y-adapter lead from control unit.

**C23**

Test chart for universal test adapter  
BMW 316, 518

**C24**

Test chart for universal test adapter  
BMW 316, 518



| TEST STEP 42  |          |   |  |
|---|----------|---|--|
| Operation   |          | Reading   | Testing  |
| Program switch "V"<br>at position:                                    | ↓        | Multimeter must indicate<br><br>25 ... 70 $\Omega$ .<br><br>(Measured value is influenced by protective resistor in universal test adapter) | Component:<br>Ignition-control valve                           |
| Program switch "Ω"<br>at position:                                    | 19       |   |  |
| Measuring equipment:<br>Multimeter ( $\Omega$ range)                  |          |   | Operation:<br>Winding resistance between term. 21 and term. 35 |
| Measuring range:<br>x 1 $\Omega$                                      |          | If reading O.K., continue testing with <u>next test step</u> .  | Malfunction:<br>Resistance outside tolerance                   |
| Connection:<br>Test sockets blue                                      | $\Omega$ |   |  |
| Operation in vehicle:<br>Ignition off.<br>Control unit not connected. |          |   |  |

#### Trouble-shooting:

For testing, disconnect control-unit plug from adapter lead and disconnect plug from ignition-control valve.

If necessary, use circuit diagram.

Check plug-in connections: corrosion, loose contact (spring contacts must not allow themselves to be pushed back).

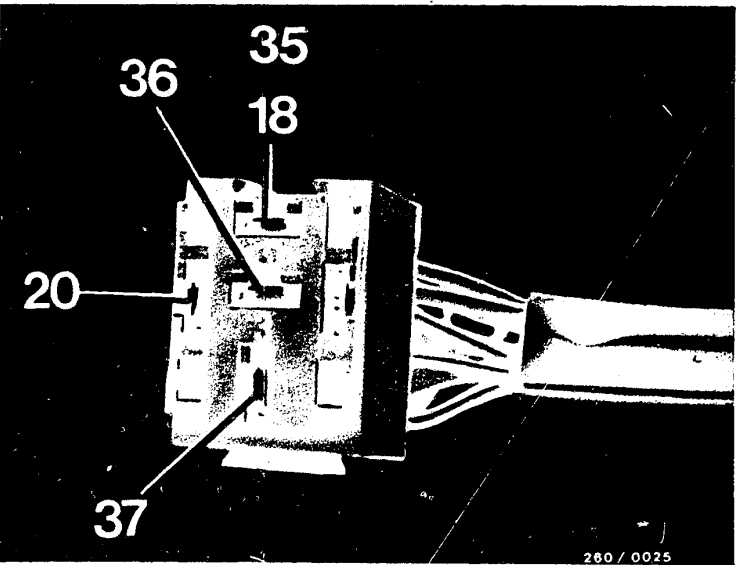
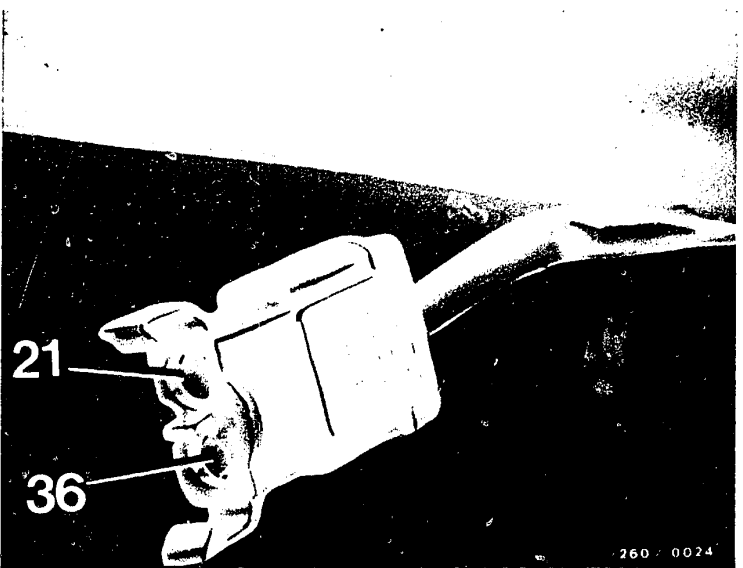
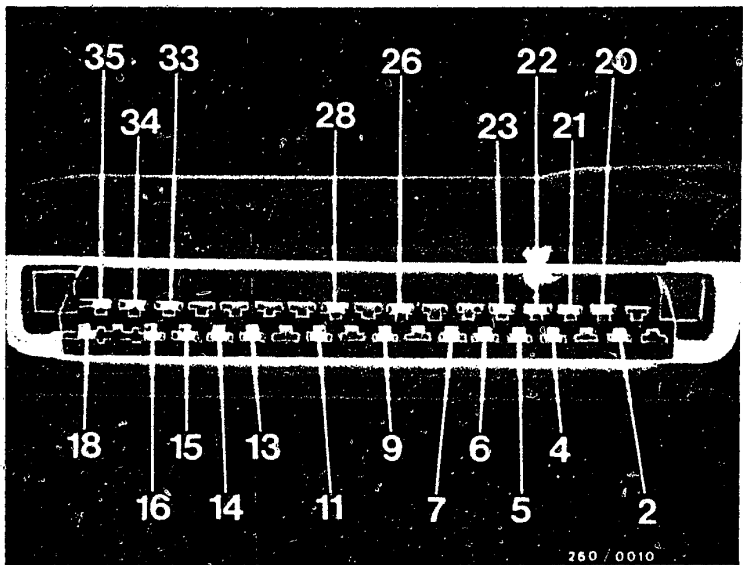
Test the following leads for continuity (set value approx. 0  $\Omega$ ):

- From control-unit plug term. 21 to ignition-control valve plug terminal 21 (top/centre pictures).
- From relay base terminal 36 to ignition-control valve plug terminal 36 (centre/bottom pictures).

Make direct resistance measurement at ignition-control valve.

Set value: 20 ... 50  $\Omega$

If set value not reached, replace ignition-control valve.



**D1**

Test chart for universal adapter

BMW 316, 518



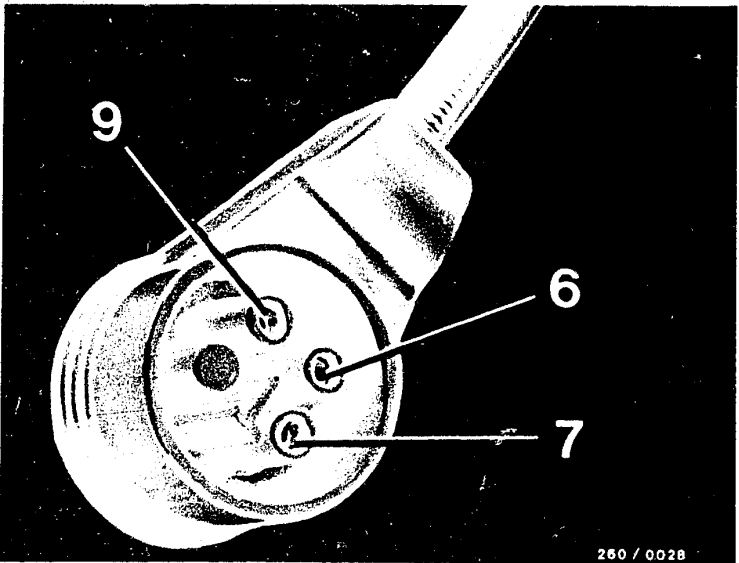
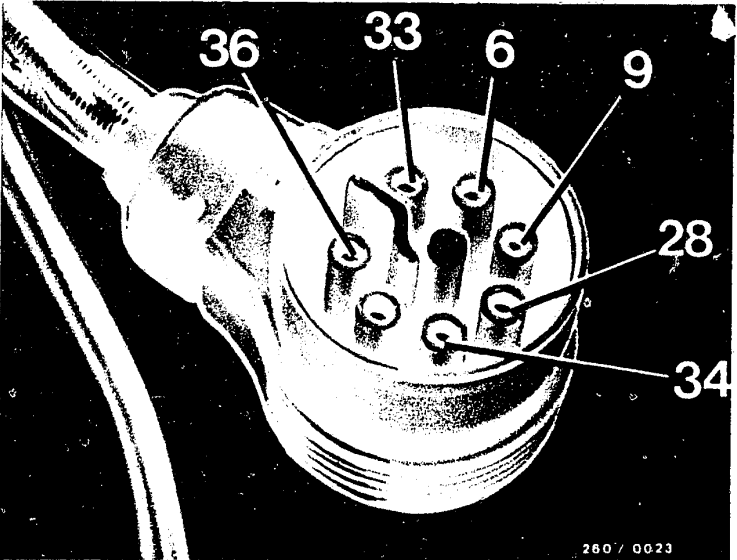
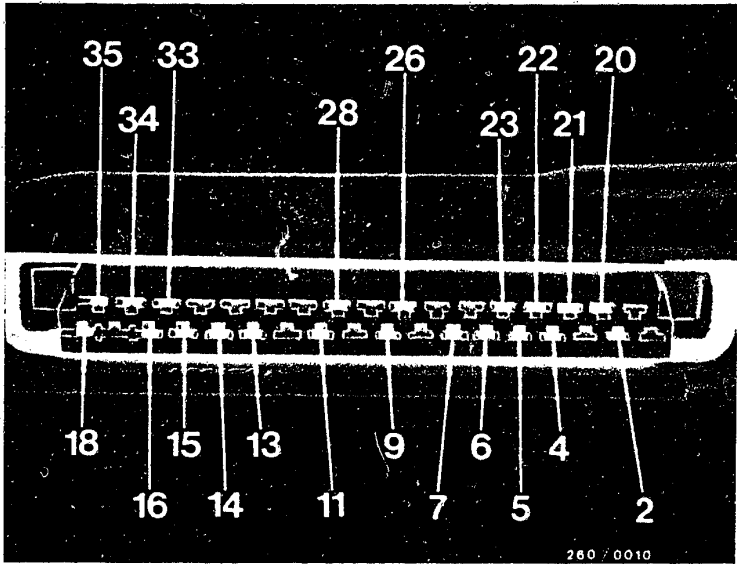
**D2**

Test chart for universal adapter

BMW 316, 518



| TEST STEP 13  |  |   |
|---|--|---|
| Operation   | Reading  | Testing   |
| <div>Program switch "V" at position:</div> <div>Program switch "Ω" at position:</div> <div>Measuring equipment:</div> <div>Multimeter (Ω range)</div> <div>Measuring range:</div> <div>x 100 Ω</div> <div>Connection:</div> <div>Test sockets blue</div> <div>Operation in vehicle:</div> <div>Ignition off.</div> <div>Control unit not connected.</div> | <div>Multimeter must indicate</div> <div>0.7 kΩ ... 1.3 kΩ.</div> <div>(Measured value is influenced by protective resistor in universal test adapter)</div> <div>If reading O.K., continue testing with next test step.</div> | <div>Component:</div> <div>Potentiometer in throttle-valve positioner and on throttle valve</div> <div>Operation:</div> <div>Resistance between term. 9 and term. 6</div> <div>Malfunction:</div> <div>Resistance outside tolerance</div> |



Trouble-shooting:

For testing, disconnect control-unit plug from test adapter, plug from throttle-valve positioner and plug from throttle-valve potentiometer.

If necessary, use circuit diagram.

Check plug-in connections: corrosion, loose contact (spring contacts must not allow themselves to be pushed back).

- Test the following leads for continuity (set value approx. 0 Ω):
- From control-unit plug term. 6 to throttle-valve positioner plug terminal 6 (centre picture).
  - From control-unit plug term. 6 to throttle-valve potentiometer plug terminal 6 (bottom picture).
  - From control-unit plug term. 9 to throttle-valve positioner plug terminal 9.
  - From control-unit plug term. 9 to throttle-valve potentiometer plug terminal 9.

Continued on D 5 / D 6

## Trouble-shooting - test step 13 (continued)

Check resistance of throttle-valve potentiometer (top picture)

Set value 1.4 ... 2.6 k $\Omega$

If set value not reached, replace throttle-valve potentiometer.

Pay attention to connector (centre picture - 1) when removing the potentiometer; it may drop out.

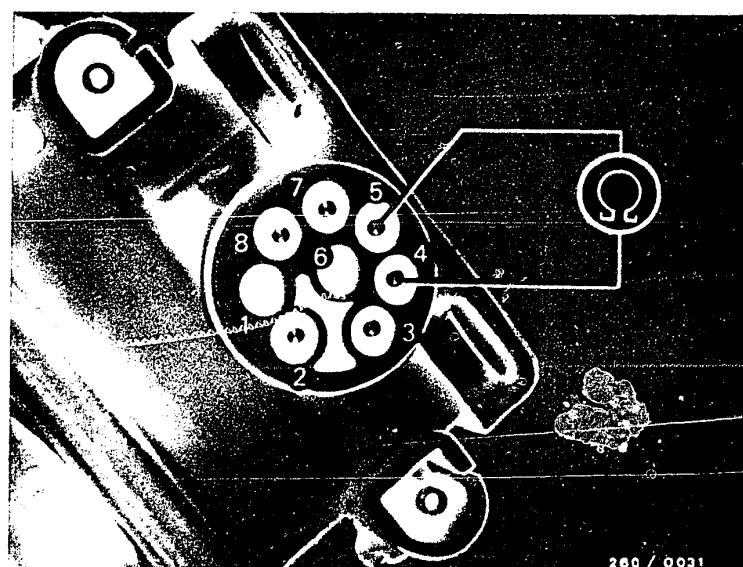
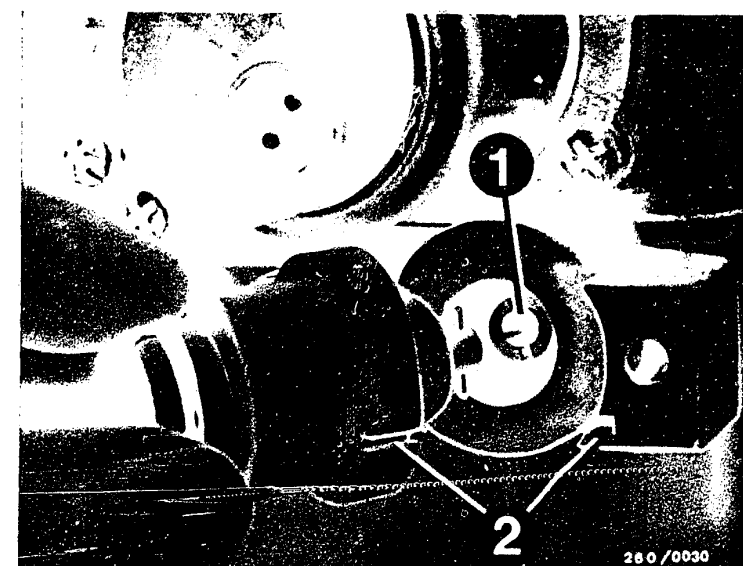
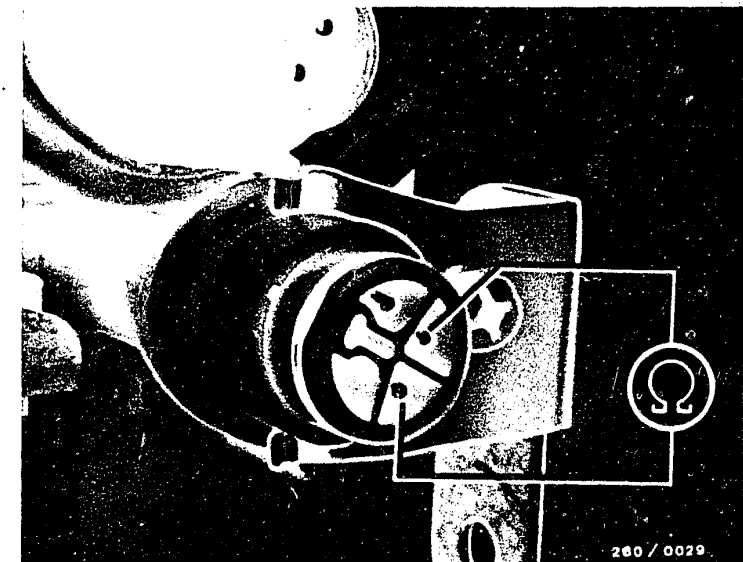
When inserting, pay attention to correct seating of connector (centre picture - 1) and locating slits (centre picture).

Check resistance of potentiometer in throttle-valve positioner (bottom picture)

Set value 1.4 ... 2.6 k $\Omega$

Measure resistance at terminals 4 and 5 (corresponding to term. 6 and term. 9).

If set value not reached, replace complete throttle-valve positioner.



Continued on D 7 / D 8

**D5**

Test chart for universal test adapter  
BMW 316, 518



**D6**

Test chart for universal test adapter  
BMW 316, 518



## Trouble-shooting - test step 13 (continued)

### Replacing the throttle-valve positioner:

Disconnect all plugs from carburetor.

Remove carburetor.

Loosen fastening nuts (3 pieces) and remove throttle-valve positioner.

Replace idle-stop screw (bottom picture - 3).

Install new throttle-valve positioner and mount carburetor.

Connect all plugs to carburetor.

### Adjusting the throttle-valve part:

Connect Y-adapter lead to control unit.

Switch on ignition.

Connect vacuum pump to evacuating valve (see top picture) and constantly produce a pressure difference (approx. 250 mbar) while adjusting.

Constantly press button T 6 on universal test adapter while adjusting or short-circuit plug of temperature sensor (simulation of engine at operating temperature - ram of throttle-valve positioner moves into position-regulated position).

In this position the feeler gauge (6.84 mm) must be able to slide between throttle-valve stop screw (centre picture - 1) and stop (2).

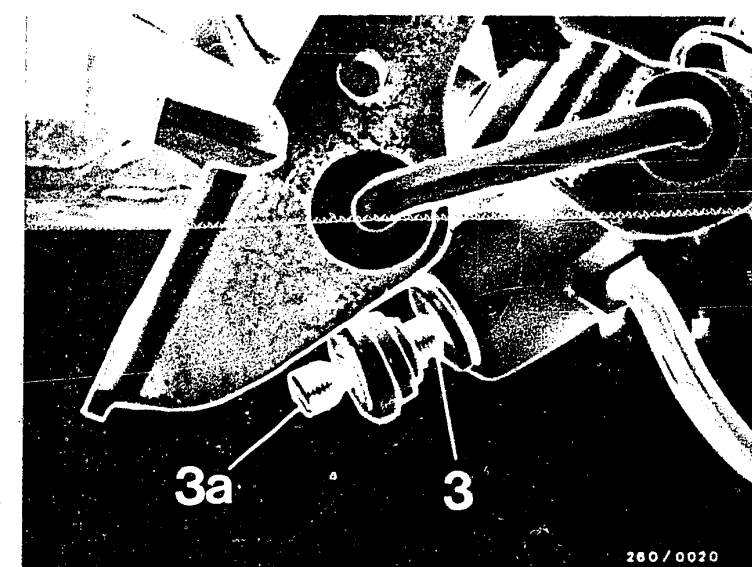
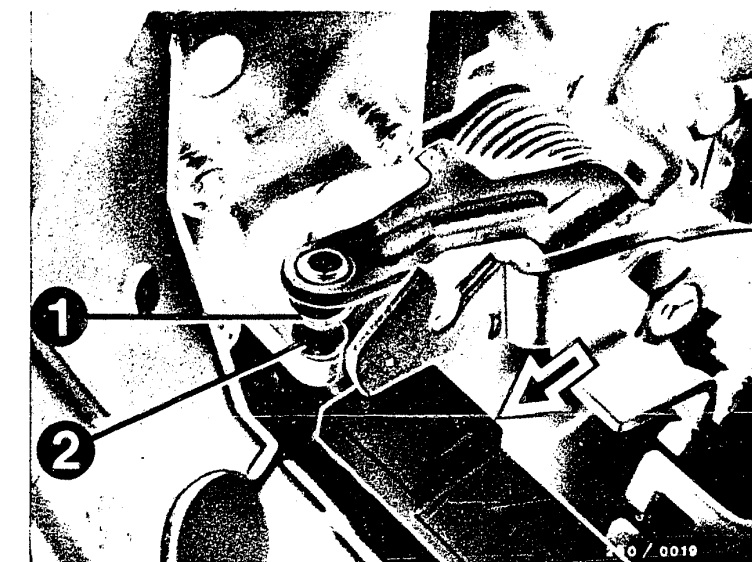
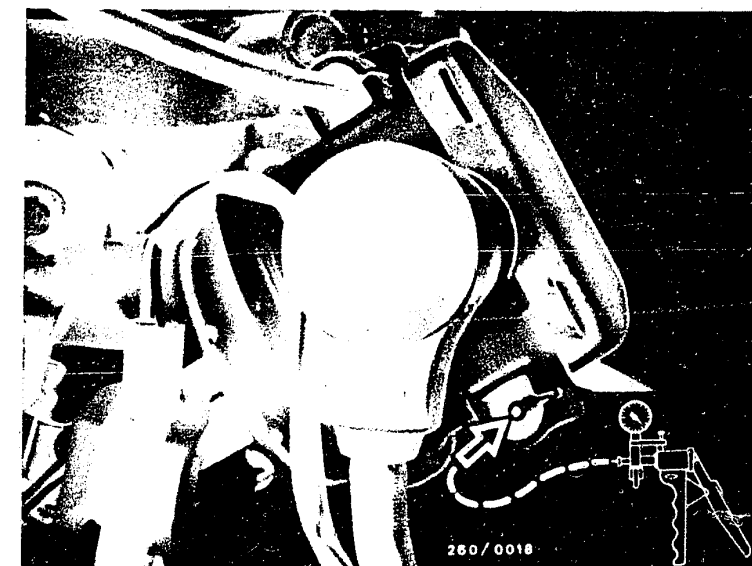
Adjust with new idle-stop screw (tear-off screw - bottom picture - 3).

Break off head (3a) of idle-stop screw.

Re-establish hose connections.

Switch off ignition.

Remove Y-adapter lead from control unit.



**D7**

Test chart for universal test adapter

BMW 316, 518



**D8**

Test chart for universal test adapter

BMW 316, 518



| TEST STEP 14   |    |   |   |
|--|----|---|---|
| Operation  |    | Reading   | Testing   |
| <u>Program switch "V"</u><br><u>in position:</u>                               | 3  | Multimeter must<br>indicate<br><br><u>0 V.</u>                      | <u>Component:</u><br><br>Lead, battery voltage<br>through ignition lock                       |
| <u>Program switch "Ω"</u><br><u>in position:</u>                               | 20 |   |   |
| <u>Measuring equipment:</u><br>Multimeter (volt range)                         |    |   |   |
| <u>Measuring range:</u><br>15 V  |    | If reading O.K.,<br>continue testing<br>with <u>next test step.</u> | <u>Operation:</u><br><br>0 V between term. 4 and<br>term. 5 (ground) on control-<br>unit plug |
| <u>Connection:</u>   |    |   |   |
| Test sockets<br>(red = +, black = ground)                                      | V  |   |   |
| <u>Operation in vehicle:</u><br><br>Ignition off<br>Control unit not connected |    | •   | <u>Malfunction:</u><br><br>Voltage equal to/greater<br>than 3 V                               |

#### Trouble-shooting:

For testing, disconnect control-unit plug from adapter lead.  
If necessary, use circuit diagram.

Test term. 4 of control-unit plug for short circuit to positive.

**D9**

Test chart for universal adapter  
BMW 316, 518



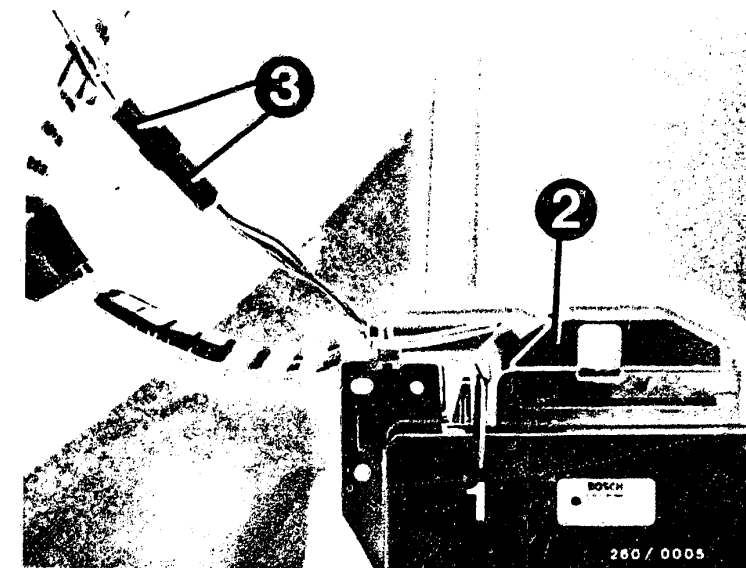
**D10**

Test chart for universal adapter  
BMW 316, 518





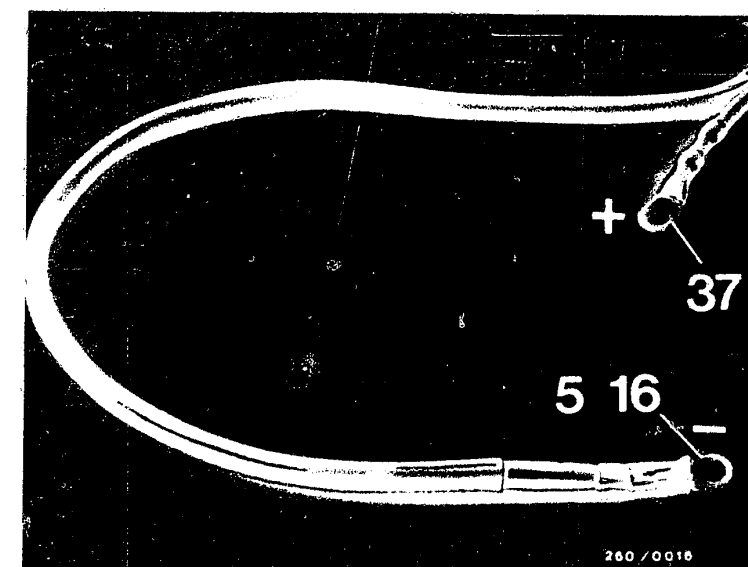
| TEST STEP 15   |    |   |  |
|--|----|---|--|
| Operation  |    | Reading   | Testing  |
| Program switch "V"<br>at position:   | 3  | Multimeter must indicate<br><br><u>10 ... 14.5 V.</u><br><br>If reading O.K.,<br>continue testing<br>with <u>next test step</u> . | <u>Component:</u><br>Vehicle terminal 15<br>(ignition lock)                                  |
| Program switch "Ω"<br>at position:   | 20 |   |  |
| <u>Measuring equipment:</u><br>Multimeter (volt range)                           |    |   | <u>Operation:</u><br>Voltage between term. 4<br>and term. 5 (ground) on<br>control-unit plug |
| <u>Measuring range:</u><br>15 V  |    |   |  |
| <u>Connection:</u><br>Test sockets<br>(red = +, black = ground)                  | V  |   | <u>Malfunction:</u><br>Voltage at term. 4 less<br>than 10 V                                  |
| <u>Operation in vehicle:</u><br>Switch on ignition<br>Control unit not connected |    |   |  |



- 1 = Detent  
2 = Control-unit plug  
3 = Plug connector

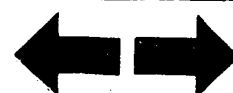
#### Trouble-shooting:

- Check plug-in connection (top picture - 3 - above glove compartment) for security.
- Switch off ignition. Disconnect control-unit plug from adapter lead. If necessary, use circuit diagram.
- Check spring contacts on control-unit plug (term. 4/term. 5) - corrosion, loose contact. The spring contacts must not allow themselves to be pushed back.
- Test term. 4 (control-unit plug) to plug (top picture - 3) terminal 2/to ignition lock for continuity.
- Test term. 5 (ground) from control-unit plug to battery (ground - terminal 31) for continuity (bottom picture).



**D11**

Test chart for universal adapter  
BMW 316, 518

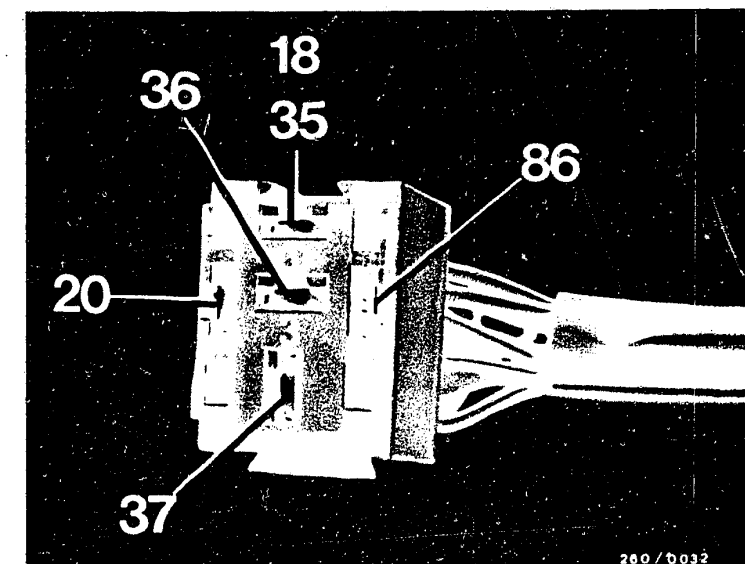


**D12**

Test chart for universal adapter  
BMW 316, 518

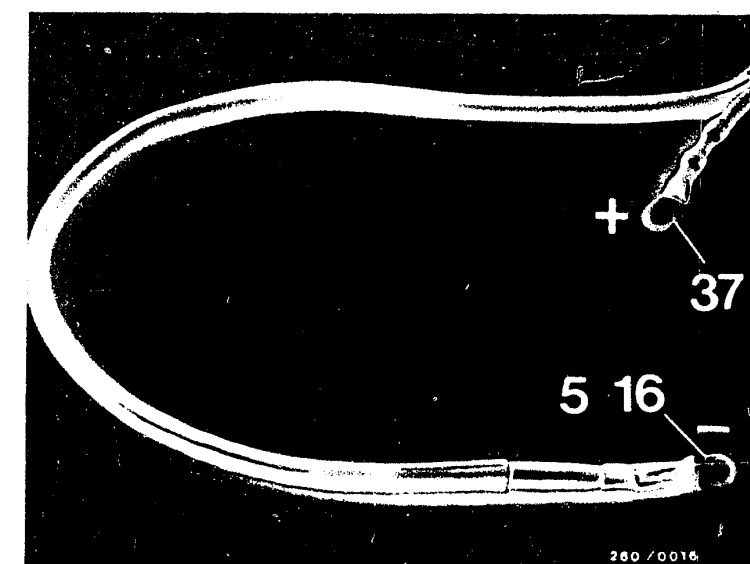


| TEST STEP 16   |    |  |  |
|--|----|--|--|
| Operation  |    | Reading  | Testing  |
| Program switch "V"<br>at position:                                 | 4  | Multimeter must indicate<br><br>9 ... 13.5 V<br><br><br><br>If reading O.K.,<br>continue testing<br>with <u>next test step</u> . | Component:<br><br>Power supply<br>(voltage at control relay)               |
| Program switch "Ω"<br>at position:                                 | 20 |  | Operation:<br><br>Voltage at relay<br>term. 20 against term. 5<br>(ground) |
| Measuring equipment:<br>Multimeter (volt range)                    |    |  |  |
| Measuring range: 15 V  |    |  | Malfunction:<br><br>No voltage or voltage too low                          |
| Connection:<br>Test sockets<br>(red = +, black = ground)           | V  |  |  |
| Operation in vehicle:<br>Ignition on<br>Control unit not connected |    |  |  |



#### Trouble-shooting:

- Switch off ignition and disconnect control-unit plug from adapter lead. If necessary, use circuit diagram.
- Disconnect control relay and test lead from battery + (bottom picture - 37) to relay base (top picture - terminals 35 and 86). Check contacts (corrosion, loose contact)
- Test lead from relay base terminal 20 to control-unit plug term. 20 for continuity. Check spring contacts term. 20 on control-unit plug (corrosion, loose contact). The spring contacts must not allow themselves to be pushed back.
- Check control relay: terminals 85 -/86 + on relay (note diode), supply voltage 12 V.



**D13**

Test chart for universal adapter  
BMW 316, 518



**D14**

Test chart for universal adapter  
BMW 316, 518



**TEST STEP 17** Switch off ignition and connect control unit -  
switch ignition on again

| <u>Operation</u>  |    | <u>Reading</u>   | <u>Testing</u>   |
|---|----|--|--|
| <u>Program switch "V"</u><br><u>at position:</u>                      | 4  | Multimeter must<br>indicate<br><br><u>less than 3 V .</u><br><br><br><br>If reading O.K.,<br>continue testing<br>with <u>next test step.</u> | <u>Component:</u><br>Energization of relay                   |
| <u>Program switch "Ω"</u><br><u>at position:</u>                      | 20 |  |  |
| <u>Measuring equipment:</u><br>Multimeter (volt range)                |    |  | <u>Operation:</u><br>Ground at term. 20                      |
| <u>Measuring range:</u><br>15 V                                       |    |  |  |
| <u>Connection:</u><br>Test sockets<br>(red = +, black = ground)       | V  |  | <u>Malfunction:</u><br>Voltage equal to/<br>greater than 3 V |
| <u>Operation in vehicle:</u><br>Ignition on<br>Control unit connected |    |  |  |

Trouble-shooting:

- Check control relay: term. 86 (+)/term. 85 (-): supply voltage 12 V.
- If necessary, replace Ecotronic control unit.

**D 15**

Test chart for universal adapter  
BMW 316, 518

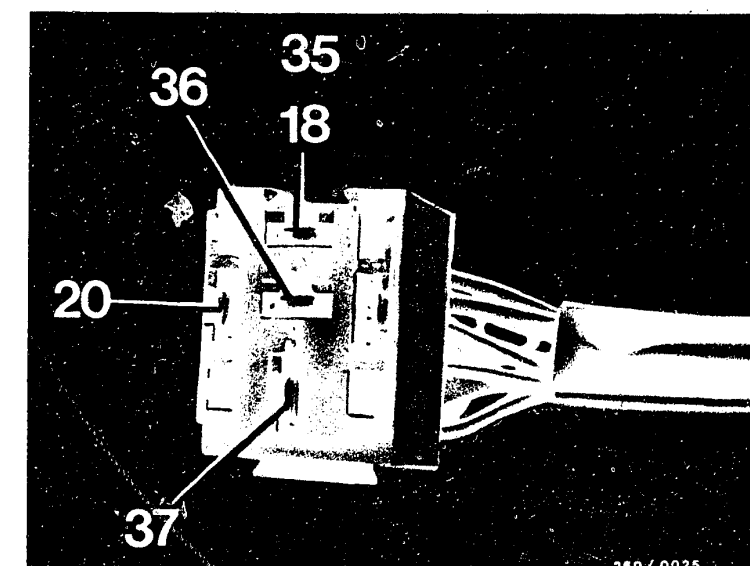


**D 16**

Test chart for universal adapter  
BMW 316, 518



| TEST STEP 18  |    |  |  |
|---|----|--|--|
| Operation   |    | Reading  | Testing  |
| <u>Program switch "V"</u><br><u>at position:</u>                      | 6  | Multimeter must indicate<br><br><u>10 ... 14.5 V.</u><br><br>If reading O.K.,<br>continue testing<br>with <u>next test step.</u> | <u>Component:</u><br>Supply voltage for control unit |
| <u>Program switch "Ω"</u><br><u>at position:</u>                      | 20 |  |  |
| <u>Measuring equipment:</u><br>Multimeter (volt range)                |    |  | <u>Operation:</u><br>Voltage at term. 35             |
| <u>Measuring range:</u> 15 V  |    |  |  |
| <u>Connection:</u><br>Test sockets<br>(red = +, black = ground)       | V  |  | <u>Malfunction:</u><br>Voltage at term. 35 too low   |
| <u>Operation in vehicle:</u><br>Ignition on<br>Control unit connected |    |  |  |



Plug-in base for control relay

#### Trouble-shooting:

- Switch off ignition. Wait for at least 20 seconds and disconnect control-unit plug from adapter lead.
- Check spring contacts on control-unit plug (corrosion, loose contacts).  
The spring contacts must not allow themselves to be pushed back.
- Test lead from control-unit plug term. 35 to control relay plug-in base (top picture - terminals 35/18) for continuity.
- Check plug-in base (corrosion, loose contacts).
- Check operation of control relay, replacing if necessary (terminals 85 (-)/86 (+): supply voltage 12 V.
- If necessary, replace control unit.

**D17**

Test chart for universal adapter  
BMW 316, 518



**D18**

Test chart for universal adapter  
BMW 316, 518



| TEST STEP 19  |    |  |   |
|---|----|--|---|
| Operation   |    | Reading  | Testing   |
| <u>Program switch "V"</u><br><u>at position:</u>                          | 8  | Multimeter must indicate<br><br><u>4.5 ... 5.5 V.</u><br><br><br>If reading O.K.,<br>continue testing<br>with <u>next test step.</u> | <u>Component:</u><br><br>Supply voltage for:<br>● potentiometer in throttle-<br>valve positioner<br>● throttle-valve potenti-<br>ometer |
| <u>Program switch "Ω"</u><br><u>at position:</u>                          | 20 |  |   |
| <u>Measuring equipment:</u><br><br>Multimeter (volt range)                |    |  |   |
| <u>Measuring range:</u> 15 V  |    |  |   |
| <u>Connection:</u><br><br>Test sockets<br>(red = +, black = ground)       | V  |  | <u>Operation:</u><br><br>Voltage at term. 9/term. 6   |
| <u>Operation in vehicle:</u><br><br>Ignition on<br>Control unit connected |    |  | <u>Malfunction:</u><br><br>Voltage less than 4.5 V<br>or greater than 5.5 V   |

### Trouble-shooting:

For testing, switch off ignition. Disconnect control relay or wait at least 20 seconds, then disconnect control-unit plug from adapter lead and adapter lead from control unit.

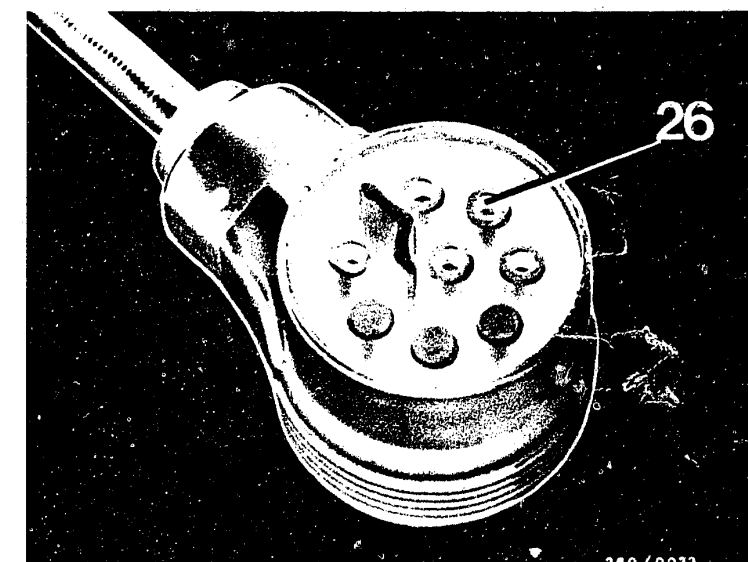
If necessary, use circuit diagram.


- Check spring contacts term. 9 and term. 6 on control-unit plug (corrosion, loose contacts).  
Contacts must not allow themselves to be pushed back.
- Disconnect plug from throttle-valve positioner and plug from throttle-valve potentiometer.
- Insulation measurement at control-unit plug:  
term. 9 against term. 5 and against term. 6 (set value  $\infty \Omega$ )
- Replace control unit.



# CAUTION

The following test steps can only be performed with the engine running.  
If the engine will not run, continue in accordance with the trouble-shooting program of your choice (B3...B6).  
For further trouble-shooting, leave test adapter and control unit connected.



| TEST STEP 20* Connect ignition oscilloscope with black clip to black test well and with red clip to red test well. |    | Reading  | Testing                                       |
|--|----|--|---|
| Operation  |    |  |   |
| Program switch "V" at position:  | 10 | <p>Display on oscilloscope</p>  <p>If reading O.K., continue testing with <u>next test step</u>.</p> | Component:<br>Engine-speed signal             |
| Program switch "Ω" at position:  | 20 |  |   |
| Measuring equipment:<br>Oscilloscope (Motortester)   |    |  | Operation:<br>Engine-speed signal at term. 26 |
| Measuring range:<br>Special input  |    |  | Malfunction:<br>No signal or signal incorrect |
| Connection: Test wells;<br>red clip to red test well,<br>black clip to black test well                             |    |  |   |
| Operation in vehicle:<br>Start engine<br>Control unit connected  |    |  |   |

## Trouble-shooting:

- Engine fails to start, but engine-speed signal present.  
Visual examination: If ram of throttle-valve positioner pulls in during cranking, then replace Ecotronic control unit.
- Switch off ignition. Wait at least 20 seconds, then disconnect control-unit plug from adapter lead and plug from ignition trigger box.  
Check contacts term. 26 (control-unit plug and trigger-box plug) (corrosion, loose contacts). Contacts must now allow themselves to be pushed back.
- Continuity test: Control-unit plug term. 26 to plug for ignition trigger box (top picture).
- Check ignition.

D21

Test chart for universal adapter

BMW 316, 518



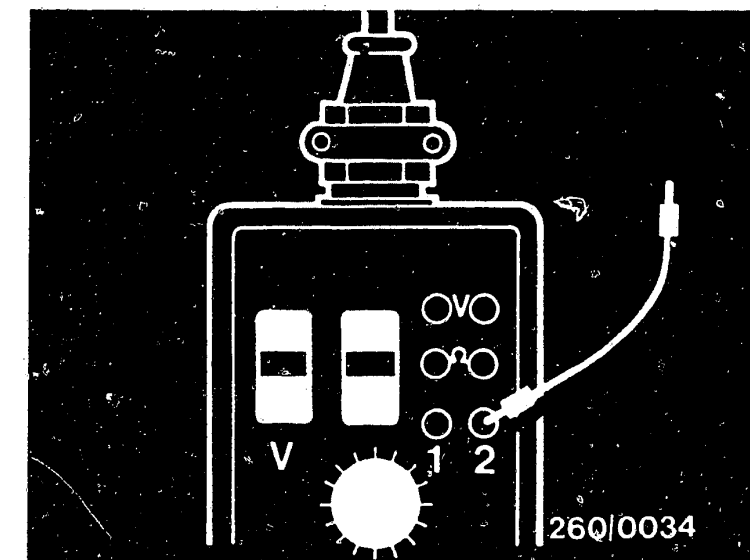
D22

Test chart for universal adapter

BMW 316, 518



| TEST STEP 21  |    | Reading  | Testing   |
|---|----|--|---|
| <u>Operation</u>  |    |  |   |
| Program switch "V"<br>at position:  | 12 | Remove bridge between<br>socket 1 and socket 2<br>on universal test<br>adapter (top picture) | <u>Component:</u><br>Throttle-valve positioner<br>(leaks)   |
| Program switch "Ω"<br>at position:  | 20 | Release accelerator  |   |
| <u>Measuring equipment:</u><br>Multimeter (volt range)  |    | Engine stops   | <u>Operation:</u><br>Engine stops.<br>Voltage value changes by<br>max. 0.2 V within 30 seconds                      |
| <u>Measuring range:</u> 5 V   |    | Reading: 0.7...1.0 V   |   |
| <u>Connection:</u><br>Test sockets<br>red = +<br>black = ground   | V  | Note reading:<br>Voltage value may<br>change by max. 0.2 V<br>within 30 sec..                | <u>Malfunction:</u><br>Voltage value $\geq 1.0$ V<br>or reading changes by more<br>than 0.2 V within 30<br>seconds. |
| <u>Operation in vehicle:</u><br>Bring engine speed to 1500...<br>1800 min <sup>-1</sup> (ram of throttle-<br>valve positioner moves into<br>position-regulated overrun<br>position) |    |  |   |



#### Trouble-shooting:

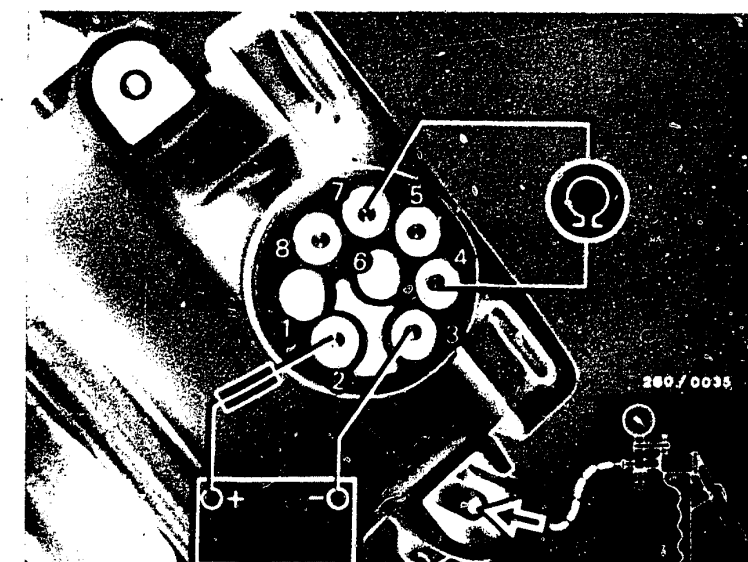
- Switch off ignition.  
Disconnect plug from throttle-valve positioner.

#### Caution!

To prevent damage as a result of interference voltage, make sure that voltage is applied only at the stated terminals.

1. Check throttle-valve positioner.
  - 1.1 Apply 12 V to terminals 2 and 3 (bottom picture)(current limitation approx. 1 A).

Continued on E 1 / E 2



**D23**

Test chart for universal adapter  
BMW 316, 518



**D24**

Test chart for universal adapter  
BMW 316, 518



### Trouble-shooting - test step 21 (continued)

Connect vacuum pump to evacuating valve (top picture).

Connect ohmmeter to terminals 4 and 7.

Using hand vacuum pump, produce approx. 250 mbar pressure difference (ram is pulled in completely).

Disconnect 12 V voltage source.

Make note of measured resistance value.

Remove vacuum pump .

- 1.2 The measured resistance value may rise by max. 200  $\Omega$  within 1 minute.

If necessary, replace throttle-valve positioner.

- ### 1.3 Test non-return valve for leaks:

Supply terminals 2 and 3 with 12 V again and observe ohmmeter.

The above-measured resistance value may now change by max. 650  $\Omega$  in 5 seconds.

- ### 1.3.1 Remove valve.

Screw M 4 screws into the closing cover and remove closing cover (centre picture).

Remove parts of non-return valve (bottom picture).

Caution:

Do not use sharp-edged tools.

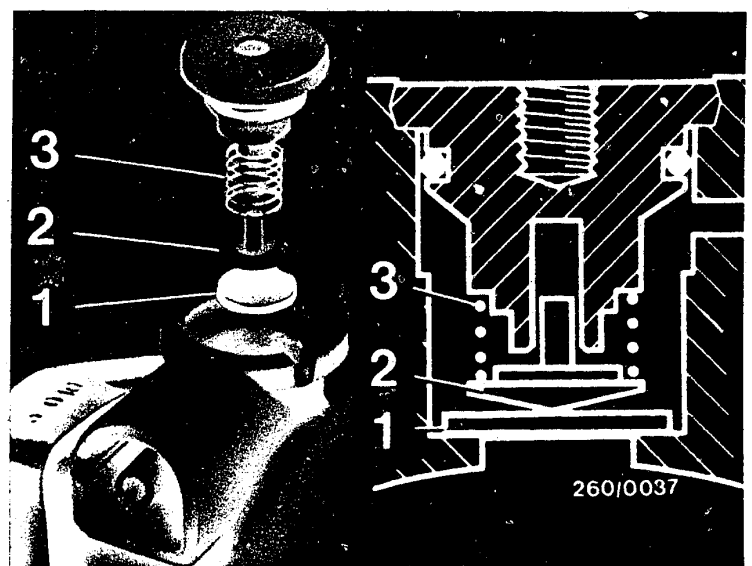
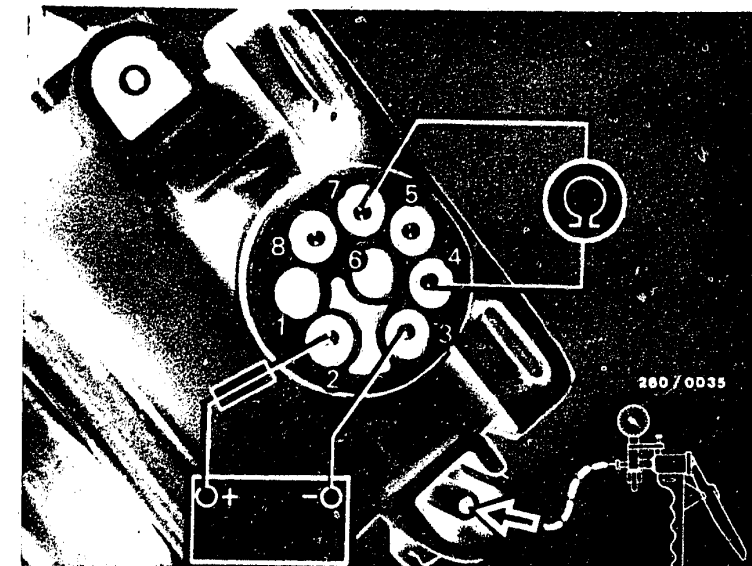
The non-return valve consists of the following parts:

Valve plate (1), guide part (2), valve spring (3)(bottom picture).

- 1.3.2 Insert new parts of valve in order shown.

Pay attention to cleanliness.

- Press in closing cover
- Test non-return valve again for leaks.



Continued on E 3 / E 4

E1

### Test chart for universal test adapter

BMW 316, 518



E2

### Test chart for universal test adapter

BMW 316, 518





## Trouble-shooting - test step 21 (continued)

### 1.4 Replacing the throttle-valve positioner:

Disconnect all plugs from carburetor.

Remove carburetor.

Loosen fastening nuts (3 pieces) and remove throttle-valve positioner.

Replace idle-stop screw (bottom picture - 3).

Install new throttle-valve positioner and mount carburetor.

Connect all plugs to carburetor.

### Adjusting the throttle-valve part:

Connect Y-adapter lead to control unit.

Switch on ignition.

Connect vacuum pump to evacuating valve (see top picture) and constantly produce a pressure difference (approx. 250 mbar) while adjusting.

Constantly press button T 6 on universal test adapter while adjusting or short-circuit plug of temperature sensor (simulation of engine at operating temperature - ram of throttle-valve positioner moves into position-regulated position).

In this position the feeler gauge (6.84 mm) must be able to slide between throttle-valve stop screw (centre picture - 1) and stop (2). Adjust with new idle-stop screw (tear-off screw - bottom picture - 3).

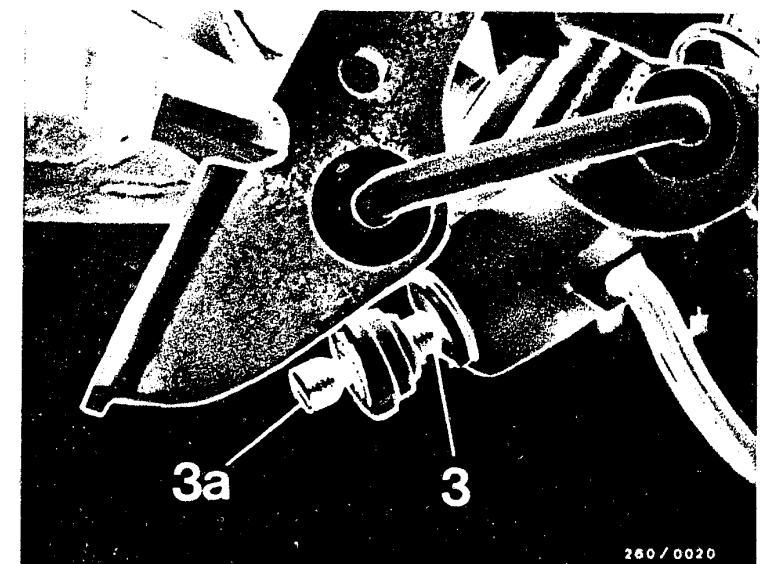
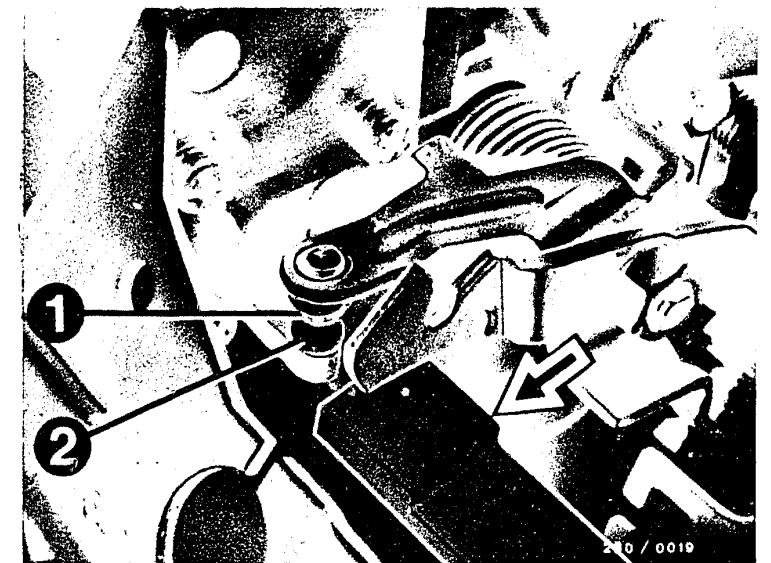
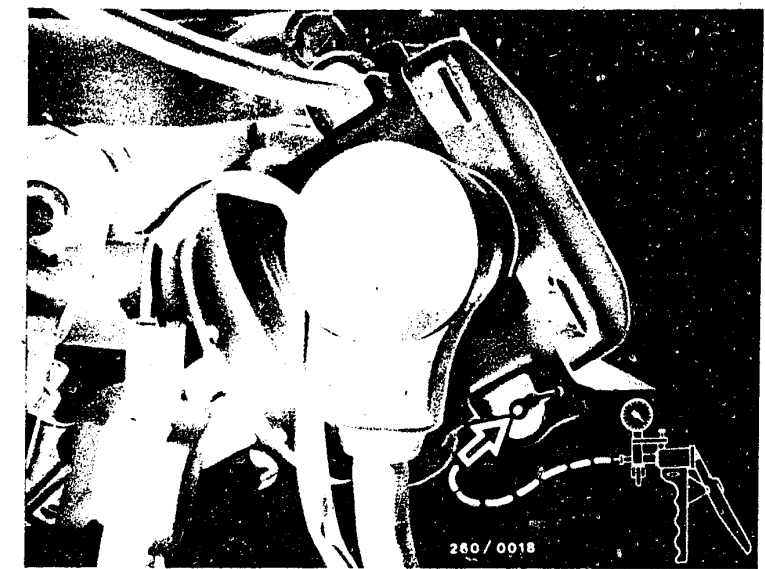
Break off head (3a) of idle-stop screw.

Re-establish hose connections.

Switch off ignition.

Remove Y-adapter lead from control unit.

### 2. Replace Ecotronic control unit.



**E3**

Test chart for universal test adapter  
BMW 316, 518



**E4**

Test chart for universal test adapter  
BMW 316, 518



| TEST STEP 22                    |    |  |
|---------------------------------|----|--|
| Operation                       |    | Testing  |
| Program switch "V" at position: | 13 | Component:<br>Throttle-valve potentiometer   |
| Program switch "Ω" at position: | 20 |  |
| Measuring equipment:            |    | Operation:<br>Wiper voltage at term. 7   |
| Multimeter (volt range)         |    |  |
| Measuring range: 5 V            |    | Malfunction: <ul style="list-style-type: none"> <li>• No change of reading</li> <li>• Min./max. reading outside tolerance</li> <li>• Reading not steady as accelerator is pressed</li> </ul> |
| Connection:                     |    |  |
| red = +, black = -              | V  |  |
| Operation in vehicle:           |    |  |
| Ignition on                     |    |  |
| Slowly depress accelerator      |    |  |

# Trouble-shooting:

Check freedom of movement of throttle cable and throttle-valve part. Switch off ignition, wait at least 15 seconds, then disconnect control-unit plug from adapter lead and plug from throttle-valve potentiometer.

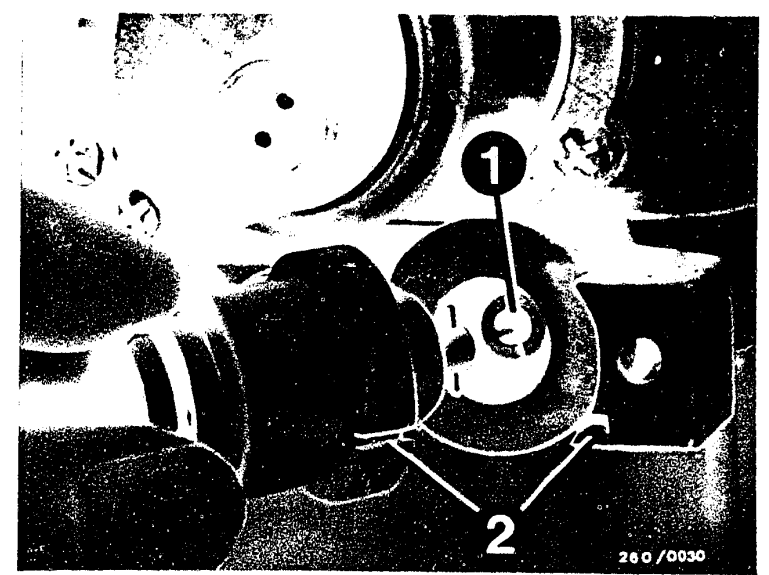
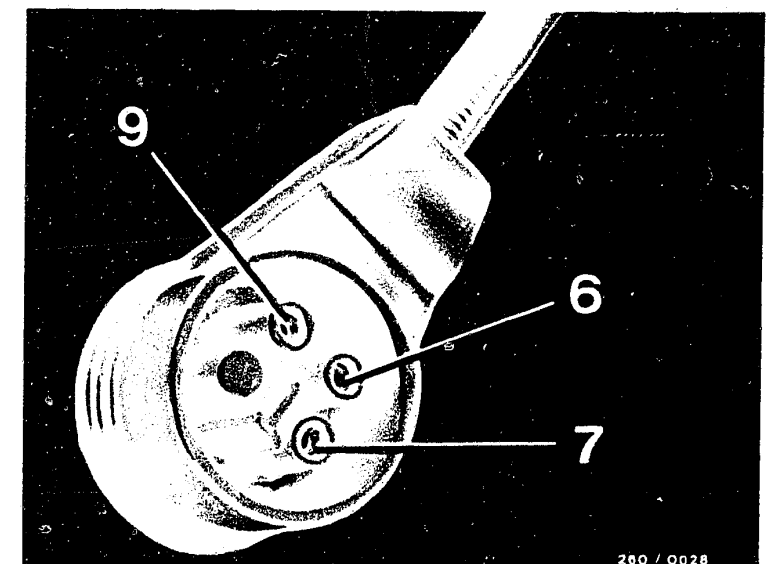
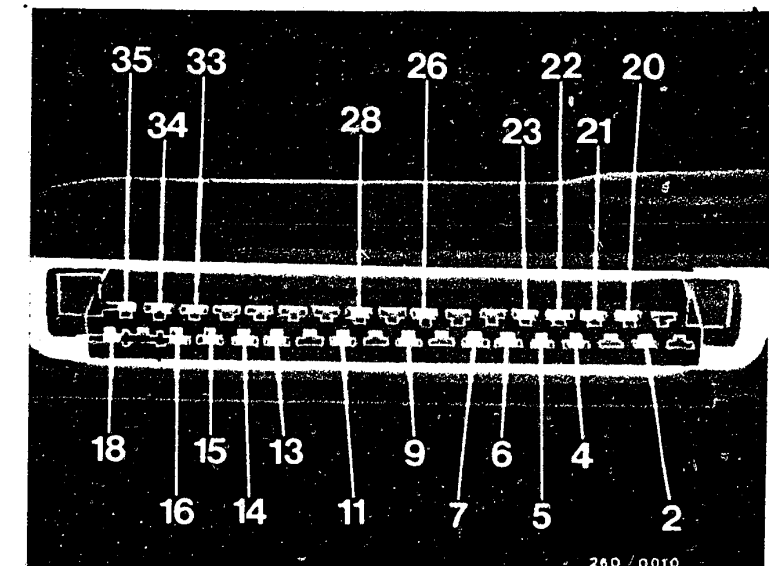
Check control-unit plug spring contact term. 7 and contact on throttle-valve potentiometer plug (centre picture - 7) (corrosion, loose contact). Contacts must not allow themselves to be pushed back.

Test lead from control-unit plug term. 7 to throttle-valve potentiometer plug for continuity.

Test term. 7 of control-unit plug for insulation against term. 6 and term. 9. If necessary, replace throttle-valve potentiometer (bottom picture):

When removing the potentiometer, pay attention to the connector (1); it may drop out.

When inserting, pay attention to correct seating of connector (1) and locating slits (2).



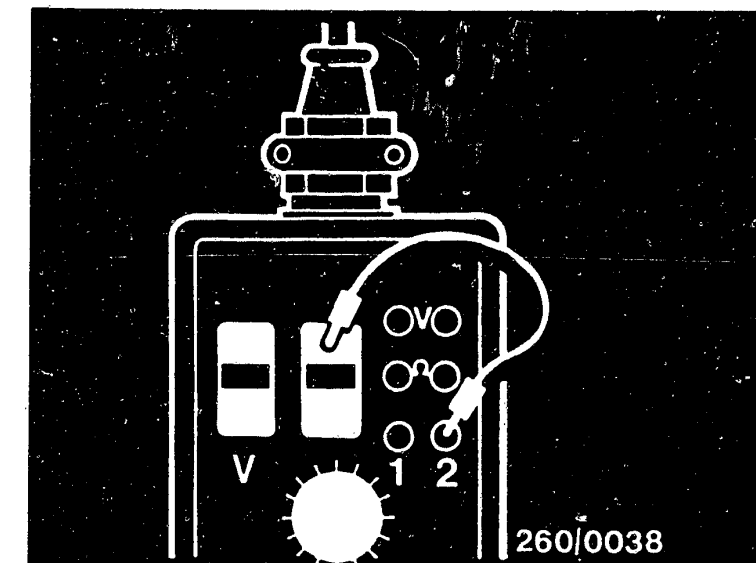
| TEST STEP 23 <u>Caution:</u> Socket 1 on universal test adapter must <u>not</u> come into contact with positive pole of supply voltage (e.g. red test well) |    |   |
|---|----|---|
| Operation   |    | Reading   |
| Program switch "V" at position:   | 12 | Multimeter must indicate<br><br>2.8...4.2 V<br>after 1 sec.               |
| Program switch "Ω" at position:   | 20 |   |
| Measuring equipment:<br>Multimeter (volt range)   |    |   |
| Measuring range: 5 V  |    | If reading O.K.,<br>continue testing with<br>next test step.              |
| Connection:<br>red = +, black = -   | V  |   |
| Operation in vehicle:<br>Connect socket 2 on universal test adapter to ground for 1 sec. (e.g. black test well) - top picture.                              |    |   |
|   |    | Testing   |
|   |    | Component:<br>Throttle-valve positioner (pressurizing side)               |
|   |    | Operation:<br>Ram of throttle-valve positioner extends fully in 1 second. |
|   |    | Malfunction:<br>Ram does not extend or does not extend fully.             |

#### Trouble-shooting:

- Test hoses and filter from throttle-valve positioner (pressurizing side) to passenger compartment (above glove compartment) for throughflow.
- Screw M 4 screw into closing cover of throttle-valve positioner (pressurizing side). Remove closing cover (centre picture).
- Remove filter (bottom picture) and insert new one with broad side (bottom picture - arrow) first. Ensure cleanliness. Press in closing cover.

Re-establish hose connections.

Continued on E 9 / E 10



**E7**

Test chart for universal adapter  
BMW 316, 518



**E8**

Test chart for universal adapter  
BMW 316, 518



### Trouble-shooting - test step 23 (continued)

Re-establish bridge between socket 1 and socket 2 on universal test adapter. Start engine. Bring engine speed to  $1500 \dots 1800 \text{ min}^{-1}$  and remove bridge again. Accelerator into idle position → engine stops. Connect socket 2 on universal test adapter to ground for 1 second (e.g. black test well).

Test specification (switch position 12): 2.8 ... 4.2 V

If test specification is not reached, replace throttle-valve positioner:

Disconnect all plugs from carburetor. Remove carburetor. Loosen fastening nuts (3 pieces) and remove throttle-valve positioner. Replace idle-stop screw. Install new throttle-valve positioner and mount carburetor. Connect all plugs to carburetor.

#### Adjusting the throttle-valve part

Connect Y-adapter lead to control unit. Switch on ignition. Connect vacuum pump to evacuating valve (see top picture) and produce constant pressure difference (approx. 250 mbar) while adjusting.

Continually press button T 6 on universal test adapter while adjusting or short-circuit plug of temperature sensor (simulation of cold engine. Ram of throttle-valve positioner moves into position-regulated position). In this position the feeler gauge (6.84 mm) must be able to slide between throttle-valve stop screw (centre picture - 1) and stop (2).

Adjust with new idle stop screw (tear-off screw - bottom picture - 3).

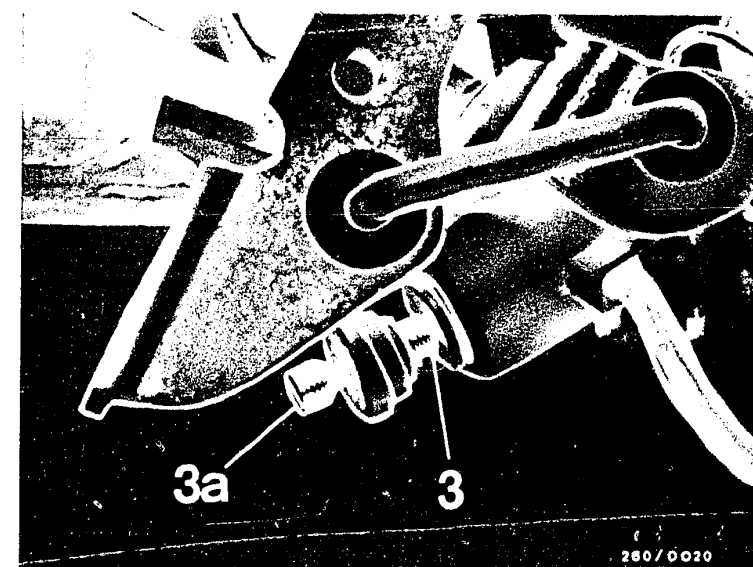
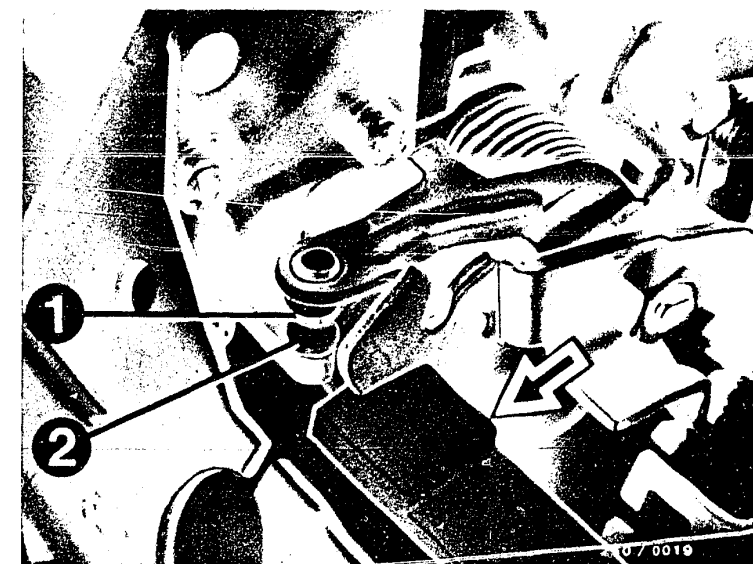
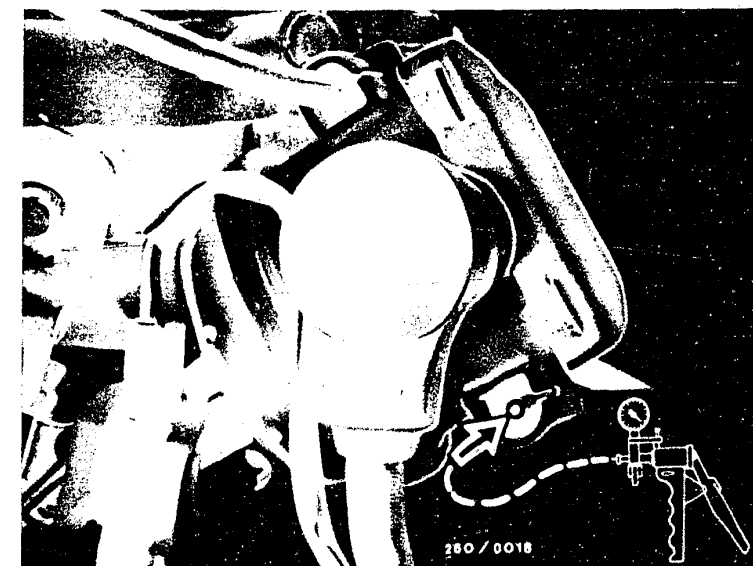
Break off head (3a) of idle-stop screw.

Re-establish hose connections.

Switch off ignition. Wait approx. 20 seconds (or disconnect control relay).

Remove Y-adapter lead from control unit.

Re-connect socket 1 and socket 2 on universal test adapter.



**E9**

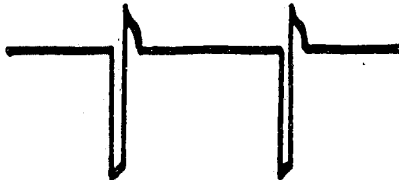
Test chart for universal test adapter  
BMW 316, 518

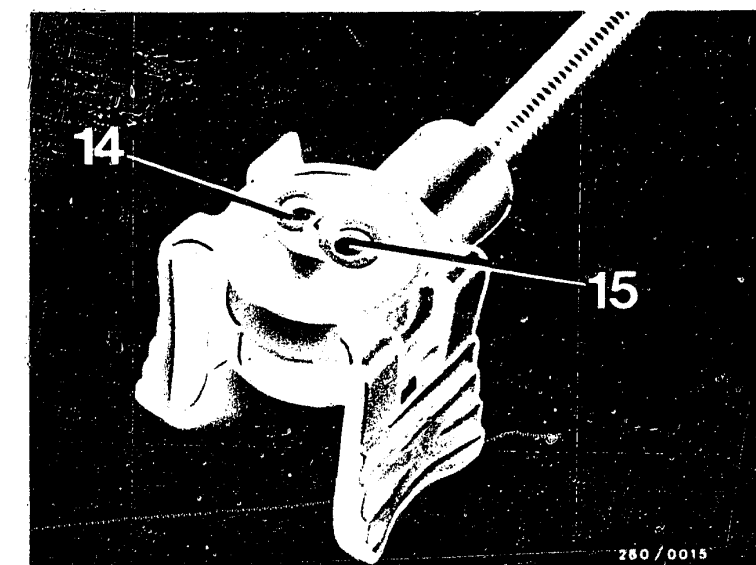


**E10**

Test chart for universal test adapter  
BMW 316, 518



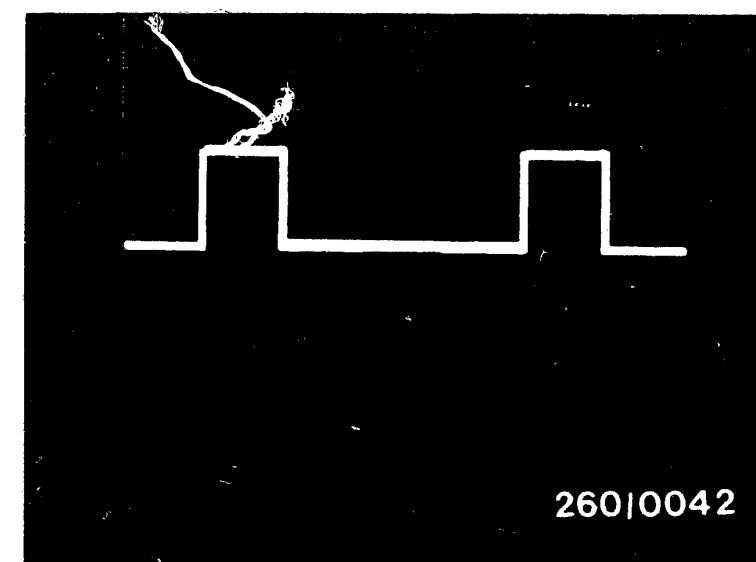
| TEST STEP 24     Connect socket 1 and socket 2 on universal test adapter                          |    |   |  |
|---|----|---|--|
| <u>Operation</u>  |    | <u>Reading</u>  | <u>Testing</u>   |
| <u>Program switch "V" at position:</u>  | 14 | Display on oscilloscope<br><br> | <u>Component:</u><br>Control unit<br>(measurement of signal for pre-throttle controller) |
| <u>Program switch "Ω" at position:</u>  | 20 |   |  |
| <u>Measuring equipment:</u><br>Oscilloscope (Motortester)   |    |   |  |
| <u>Measuring range:</u><br>Special input  |    |   | <u>Operation:</u><br>Corresponding signal at term. 15                                    |
| <u>Connection:</u><br>Test wells;<br>red clip to red test well,<br>black clip to black test wells |    |   | <u>Malfunction:</u><br>No signal or signal incorrect                                     |
| <u>Operation in vehicle:</u><br>Engine running  |    |   |  |



#### Trouble-shooting:

- Switch off ignition.
- Disconnect plug from pre-throttle controller (top picture).  
Connect multimeter (analog) to term. 14 and term. 15 on plug of pre-throttle controller (top picture).  
Select 15 V voltage range. (Instrument is used only to load control unit.)
- Start engine and check pulses with ignition oscilloscope. For pulse shape see bottom picture.  
If no pulses, replace Ecotronic control unit.  
If pulses present: replace pre-throttle controller.

Continued on E 13 / E 14



Trouble-shooting - test step 24 (continued)

Replacing the pre-throttle controller

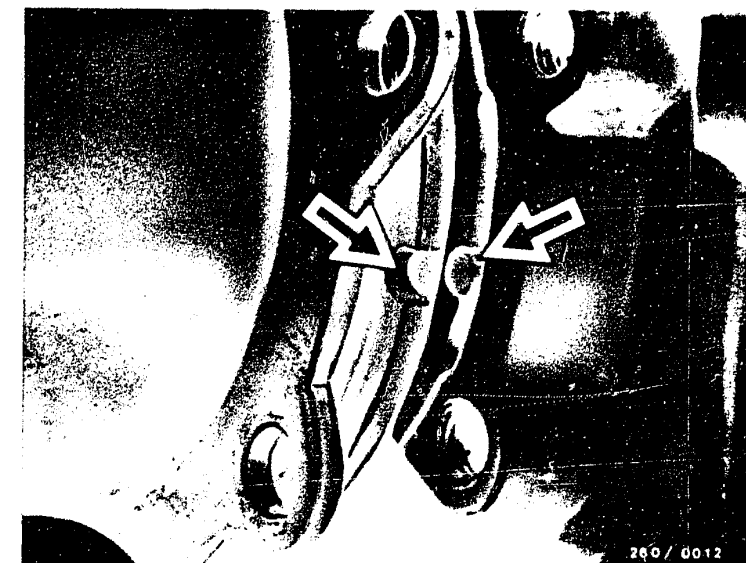
Removal:

Unscrew air filter.

Loosen 4 fastening screws of pre-throttle controller.

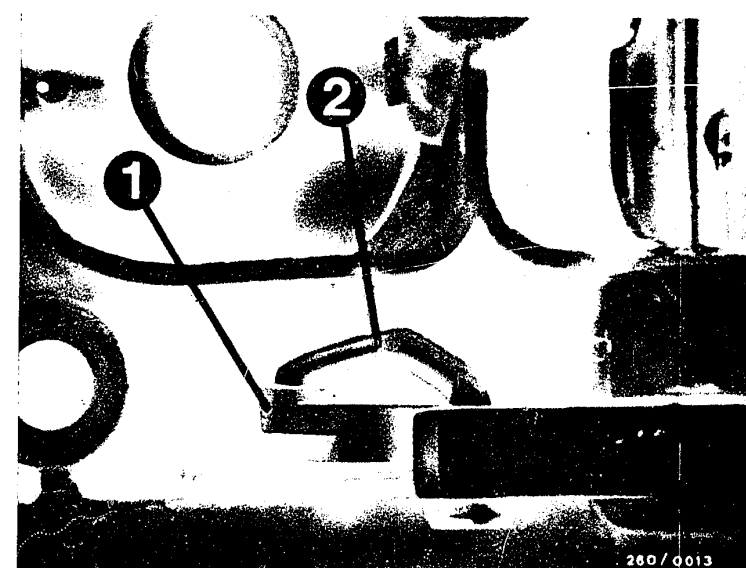
Installation:

When installing the pre-throttle controller, pay attention to its locating (top picture - arrows) as well as to the correct position of the lever (bottom picture - 1) when inserting the connecting rods (2).



Arrows = Locating

1 = Lever  
2 = Connecting rod



**E13**

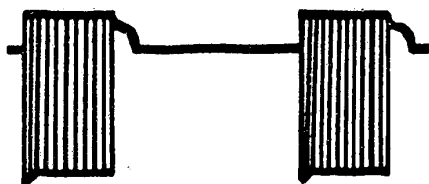
Test chart for universal test adapter  
BMW 316, 518



**E14**

Test chart for universal test adapter  
BMW 316, 518



| TEST STEP 25  |    |  |  |
|---|----|--|--|
| Operation   |    | Reading  | Testing  |
| Program switch "V"<br>at position:  | 14 | Display on oscillo-<br>scope   | <u>Component:</u><br>Control unit<br>(measurement of signal<br>for pre-throttle<br>controller) |
| Program switch "Ω"<br>at position:  | 20 |  |  |
| <u>Measuring equipment:</u><br>Oscilloscope (Motortester)   |    | Signal becomes wider<br>when button T 5 is<br>pressed.                             | <u>Operation:</u><br>Influence of temperature  |
| <u>Measuring range:</u><br>Special input  |    |  |  |
| <u>Connection:</u><br>Test wells;<br>red clip to red test well,<br>black clip to black test wells |    | If reading O.K.,<br>continue testing<br>with <u>next test step</u> .               | <u>Malfunction:</u><br>Signal does not become<br>wider when button T 5<br>is pressed           |
| <u>Operation in vehicle:</u><br>Engine running  |    |  |  |
| <u>Additional operation:</u><br>Press button T 5 on test adapter                                  |    |  |  |

#### Trouble-shooting:

- Replace control unit.

**E15**

Test chart for universal adapter

BMW 316, 518

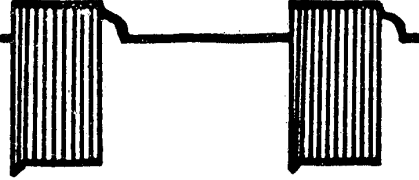


**E16**

Test chart for universal adapter

BMW 316, 518



| TEST STEP 26   |    |  |   |
|--|----|--|---|
| Operation  |    | Reading  | Testing   |
| Program switch "V"<br>at position:   | 14 | Display on oscillo-<br>scope<br><br> | Component:<br>Control unit                          |
| Program switch "Ω"<br>at position:   | 20 |  |   |
| Measuring equipment:<br>Oscilloscope, (Motortester)                        |    |  | Operation:<br>Acceleration enrichment               |
| Measuring range:   |    |  |   |
| Special input  |    |  |   |
| Connection:  |    | If reading O.K.,<br>continue testing<br>with <u>next test step</u> .   | Malfunction:  |
| Test wells;<br>red clip to red test well<br>black clip to black test wells |    |  | No change of display when<br>accelerator is pressed |
| Operation in vehicle:  |    |  |   |
| Engine running.<br>Briefly press accelerator.                              |    |  |   |

Trouble-shooting:

- Replace control unit.



# TEST STEP 27

## Operation

Program switch "V"  
at position:

14

Program switch "Ω"  
at position:

20

## Measuring equipment:

CO measuring instrument

## Measuring range:

% by vol. CO

## Connection:

Exhaust

## Operation in vehicle:

Engine running and at  
operating temperature.  
Do not press accelerator.

## Additional operation:

Press button T 5 on test  
adapter

## Reading

CO concentration  
rises.

3...6 % by vol.CO

If reading O.K.,  
continue testing with  
next test step.

## Testing

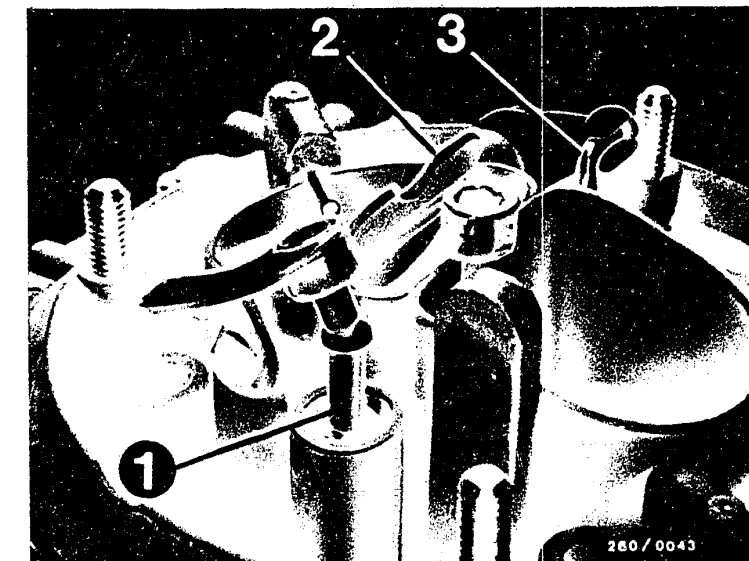
Component:  
Control unit

## Operation:

CO concentration rises  
when "cold engine" is  
simulated.

## Malfunction:

No change of CO  
concentration



## Trouble-shooting:

- Switch off ignition.
- Remove air filter.
- Check whether connecting rod is hooked into lever of pre-throttle valve positioner and into pre-throttle valve.
- Check pre-throttle valve for freedom of movement:  
Press idle-air correction needle (1) down with screwdriver.  
The pre-throttle valve must drop to on its own.  
If necessary, unhook connecting rod (3) and restore freedom of movement (e.g. with WD 40). Under no circumstances bend.  
If stiff, replace pre-throttle controller.

Continued on E 21 / E 22

**E19**

Test chart for universal adapter

BMW 316, 518



**E20**

Test chart for universal adapter

BMW 316, 518



Trouble-shooting - test step 27 (continued)

Replacing the pre-throttle controller

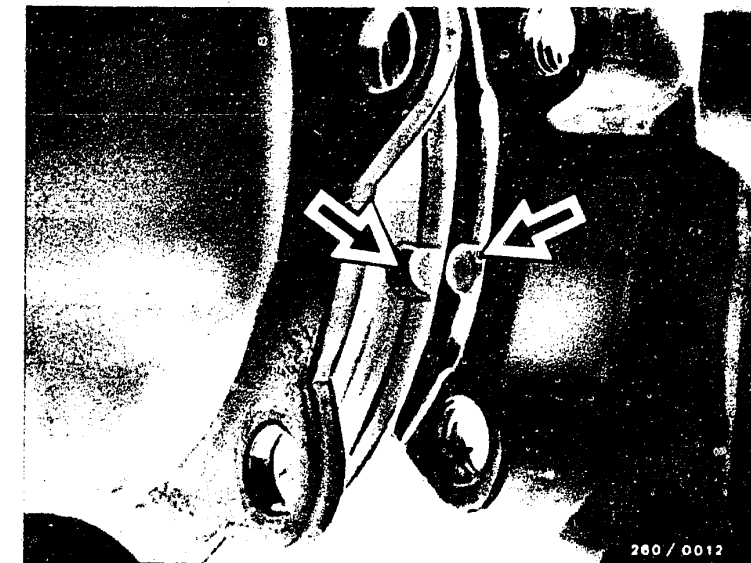
Removal:

Unscrew air filter.

Loosen 4 fastening screws of pre-throttle controller.

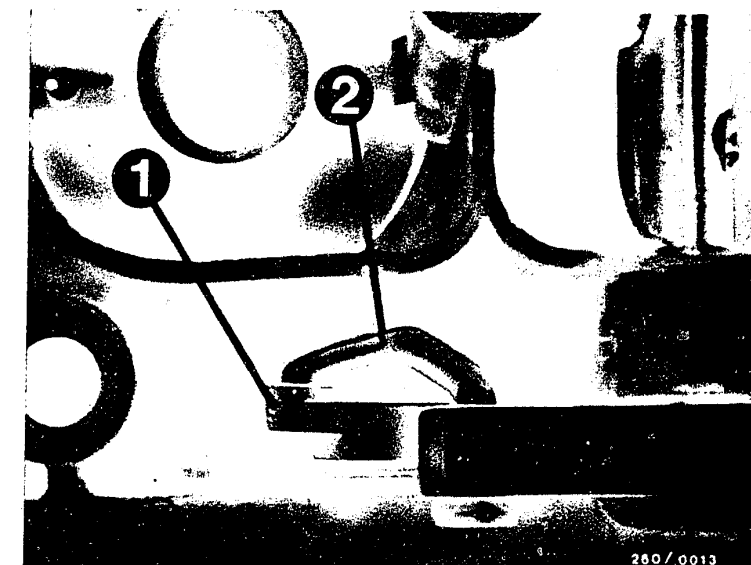
Installation:

When installing the pre-throttle controller, pay attention to its locating (top picture - arrows) as well as to the correct position of the lever (bottom picture - 1) when inserting the connecting rods (2).



Arrows = Locating

1 = Lever  
2 = Connecting rod



**E21**

Test chart for universal test adapter  
BMW 316, 518



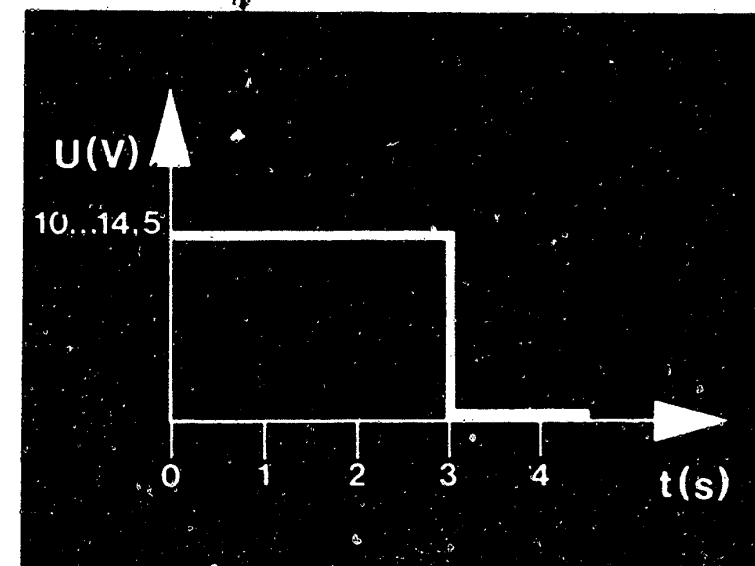
**E22**

Test chart for universal test adapter  
BMW 316, 518



# TEST STEP 28

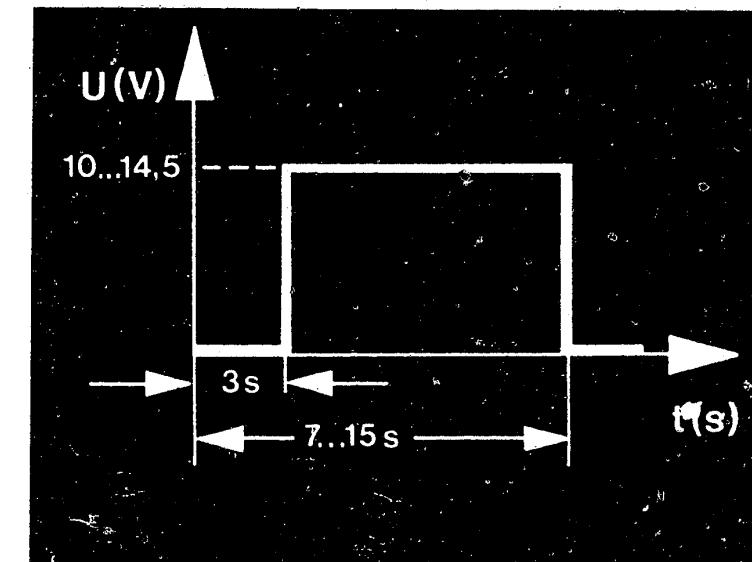
| Operation   |    | Reading   | Testing  |
|---|----|---|--|
| <u>Program switch "V"</u><br><u>at position:</u>                | 15 | Ignition OFF:<br><u>10 ... 14.5 V</u><br>after approx. 3 sec.:<br><u>&lt; 1 V</u> | <u>Components:</u> <ul style="list-style-type: none"><li>● Control unit</li><li>● Throttle-valve positioner (pressurizing valve)</li></ul> |
| <u>Program switch "Ω"</u><br><u>at position:</u>                | 20 |   |  |
| <u>Measuring equipment:</u><br>Multimeter (volt range)          |    |   |  |
| <u>Measuring range:</u><br>15 V                                 |    |   | <u>Operation:</u><br>Pressurizing valve is energized (term. 34)  |
| <u>Connection:</u><br>Test sockets<br>(red = +, black = ground) | V  |   | <u>Malfunction:</u><br>Voltage reading ≥ 3 V<br>Ram does not extend.   |
| <u>Operation in vehicle:</u><br>Switch off ignition             |    |   |  |



## Trouble-shooting:

- Replace control unit.

| TEST STEP 29                                     |    |   |                |
|--|----|---|----------------|
| <u>Operation</u>                                 |    | <u>Reading</u>  | <u>Testing</u> |
| <u>Program switch "V"</u><br><u>at position:</u> | 16 | Ignition OFF:<br><br><u>&lt; 1 V</u><br>after approx. 3 sec.<br><u>10...14.5 V</u><br>after 7...15 sec.:<br><u>&lt; 1 V</u><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br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#### Trouble-shooting:

- Replace control unit.

**F1**

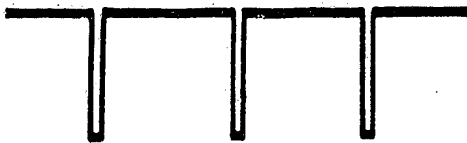
Test chart for universal adapter  
BMW 316, 518



**F2**

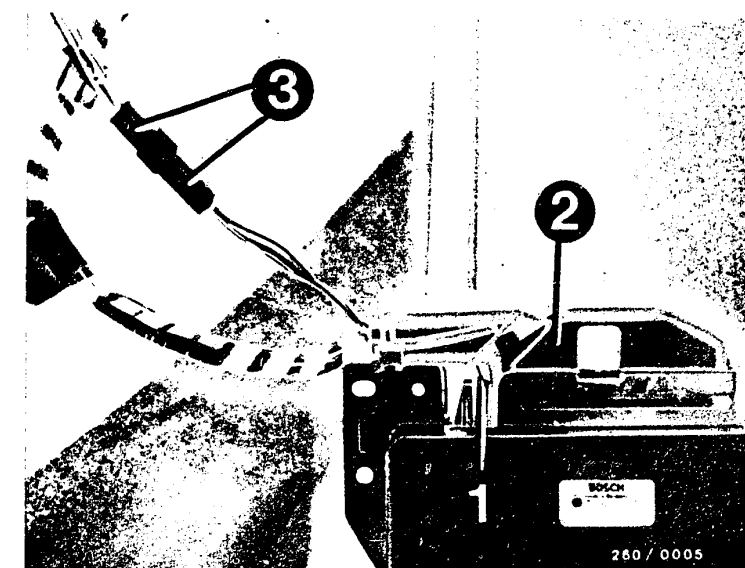
Test chart for universal adapter  
BMW 316, 518



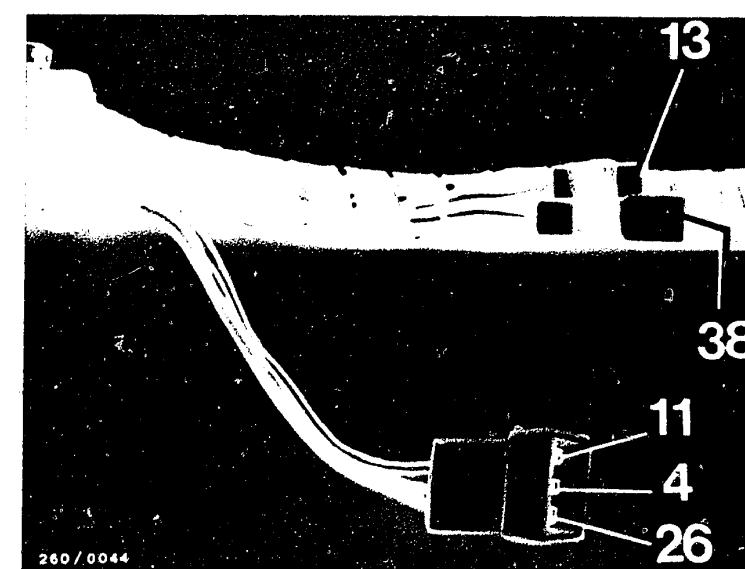
| TEST STEP 30  |    |   |
|---|----|---|
| Operation   |    | Reading   |
| Program switch "V" at position:                                 | 17 | Display on oscilloscope<br> |
| Program switch "Ω" at position:                                 | 20 |   |
| Measuring equipment:  |    |   |
| Oscilloscope (Motortester)                                      |    | If reading O.K.,<br>continue testing with<br>next test step.  |
| Measuring range:  |    |   |
| Special input   |    |   |
| Connection:   |    | No signal or signal<br>incorrect  |
| Test wells; red clip to red well, black clip to black test well |    |   |
| Operation in vehicle:   |    |   |
| Start engine  |    |   |

#### Trouble-shooting:

- Switch off ignition. Wait at least 20 seconds or disconnect control relay. Disconnect control-unit plug from adapter lead.
- Check contact term. 11 (corrosion, loose contact). Contact must not allow itself to be pushed back.
- Disconnect plug (on wiring harness, above glove compartment - top picture - 3).
- Test lead term. 11 of control-unit plug to plug term. 11 (terminal 3) for continuity (bottom picture).
- Test term. 11 (terminal 3 on plug) against term. 5 (ground) and against term. 4 (terminal 2) and against term. 26 (terminal 1) for short circuit (bottom picture).
- Perform test also on connector.
- If no fault is found, then replace Ecotronic control unit.



- 1 = Detent  
2 = Control-unit plug  
3 = Plug



**F3**

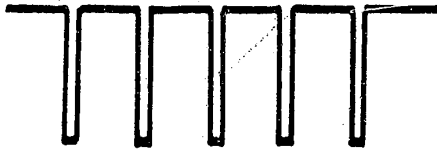
Test chart for universal adapter  
BMW 316, 518



**F4**

Test chart for universal adapter  
BMW 316, 518



| TEST STEP 31  |    |   |  |
|---|----|---|--|
| Operation   |    | Reading   | Testing  |
| Program switch "V" at position:   | 17 | <div>Display on oscillo-<br/>scope</div>  | <u>Component:</u><br>Signal for consumption<br>computer  |
| Program switch "Ω" at position:   | 20 |   | <div><u>Operation:</u><br/>Corresponding signal at<br/>term. 11 for consumption<br/>computer (in instrument<br/>cluster)</div> |
| <u>Measuring equipment:</u><br>Oscilloscope (Motortester)   |    |   |  |
| <u>Measuring range:</u><br>Special input  |    |   |  |
| <u>Connection:</u><br>Test wells;<br>red clip to red test well,<br>black clip to black test well. |    | <div>If reading O.K.,<br/>continue testing<br/>with <u>next test step.</u></div>  | <div><u>Malfunction:</u><br/>No signal or signal<br/>incorrect</div>   |
| <u>Operation in vehicle:</u><br>Engine running  |    |   |  |
| <u>Additional operation:</u><br>Press button T 5 on universal<br>test adapter                     |    |   |  |

Trouble-shooting:

- Replace Ecotronic control unit.

**F5**

Test chart for universal adapter  
BMW 316, 518



**F6**

Test chart for universal adapter  
BMW 316, 518



# TEST STEP 32

## Operation

Program switch "V"  
at position:

18

Program switch "Ω"  
at position:

20

Measuring equipment:

Multimeter (volt range)

Measuring range:

15 V

Connection:

Test sockets red = +  
black = ground

V

Operation in vehicle:

Engine running and at operating  
temperature.  
Accelerator in idle position.

## Reading

Multimeter must  
indicate

less than 1 V.

If reading O.K.,  
continue testing  
with next test step.

## Testing

Component:

Energization of ignition-  
control valve  
(valve closed).

Operation:

Voltage at term. 21

< 1 V

Malfunction:

Voltage ≥ 1 V

## Trouble-shooting:

- Replace Ecotronic control unit.

**F7**

Test chart for universal adapter  
BMW 316, 518



**F8**

Test chart for universal adapter  
BMW 316, 518



| TEST STEP 33  |    |   |   |
|---|----|---|---|
| Operation   |    | Reading   | Testing   |
| <u>Program switch "V"</u><br><u>at position:</u>  | 18 | Multimeter must<br>indicate<br><br><u>10...14.5 V.</u><br><br><br><br>If reading O.K.,<br>continue testing<br>with <u>next test step.</u> | <u>Component:</u><br>Energization of ignition-<br>control valve<br>(valve open) |
| <u>Program switch "Ω"</u><br><u>at position:</u>  | 20 |   |   |
| <u>Measuring equipment:</u><br>Multimeter (volt range)                                      |    |   |   |
| <u>Measuring range:</u><br>15 V   |    |   |   |
| <u>Connection:</u><br>Test sockets red = +<br>black = ground                                | V  |   |   |
| <u>Operation in vehicle:</u><br>Bring engine speed to<br>> 1000 min <sup>-1</sup> and hold. |    |   | <u>Operation:</u><br>Voltage at term. 21<br>10 ... 14.5 V                       |
|   |    |   | <u>Malfunction:</u><br>Voltage      < 10 V                                      |

#### Trouble-shooting:

- Replace Ecotronic control unit.

**F9**

Test chart for universal adapter  
BMW 316, 518



**F10**

Test chart for universal adapter  
BMW 316, 518





Testing with the universal test adapter is now completed.

If the fault has not been found, or if further instructions and information are required on how to remedy the trouble, proceed in accordance with the trouble-shooting chart (B3 ... B6).

**F11**

Test chart for universal test adapter

BMW 316, 518



## COMPONENT TESTING

### 1. Driver error

Start in accordance with instructions (accelerator in idle position).

### 2. Vacuum system leaking (unmetered air)

Test by means of visual examination or, if in doubt, as follows:

Unscrew air filter. Close top part of carburetor by means of suitable cover. (Cover must have small opening for compressed-air gun.)

If necessary, seal off exhaust.

Using compressed-air gun, blow air through the opening in the cover into the intake system.

Throttle valve must be fully open when doing this.

Brush joints (carburetor flange, intake manifold, temperature sensor) with soapy water or spray with leak-detector spray (e.g. Gupoflex).

Under no circumstances may combustible liquids be used for testing for leaks.

Bubbling or foaming indicates a leak.



### 3. Test fuel pressure:

Check the fuel pressure using pressure/vacuum tester:

Unscrew fuel delivery line (on carburetor).

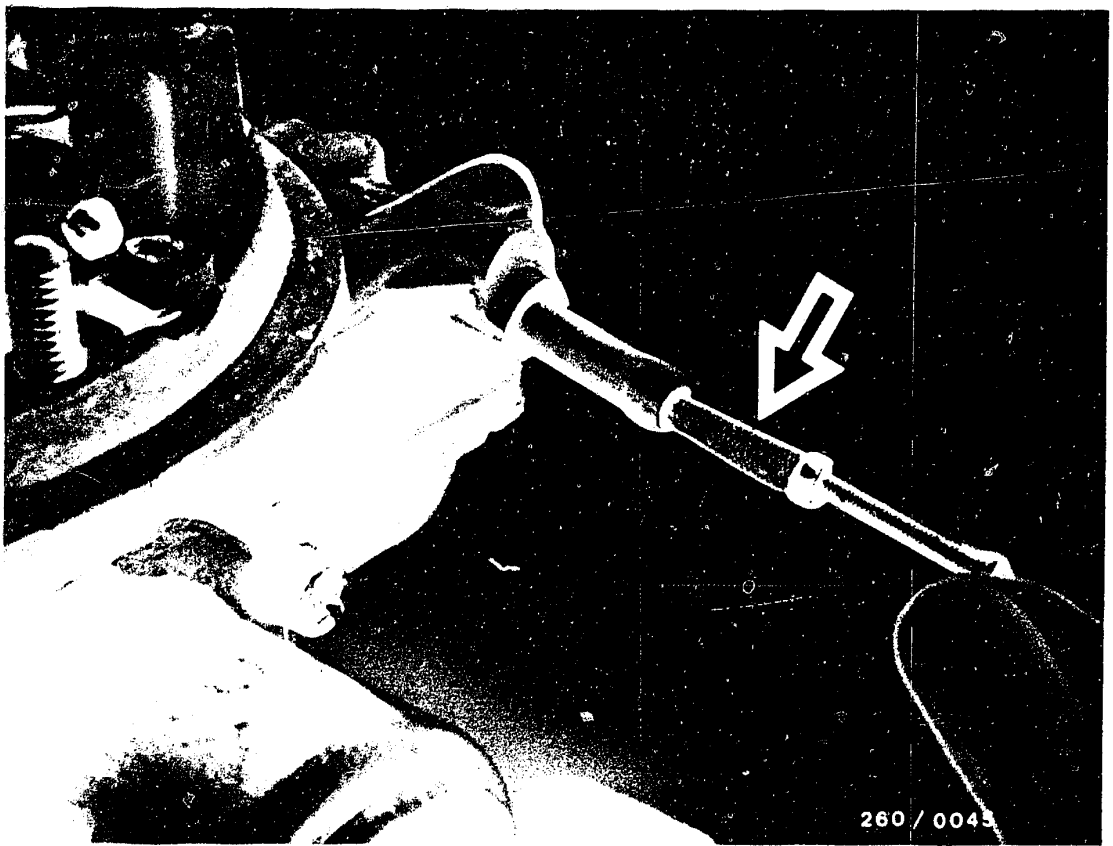
Connect Y-connection piece to carburetor, fuel pump and pressure/vacuum tester.

Make sure there are no leaks.

Start engine.

Test specification: 0.1 ... 0.3 bar





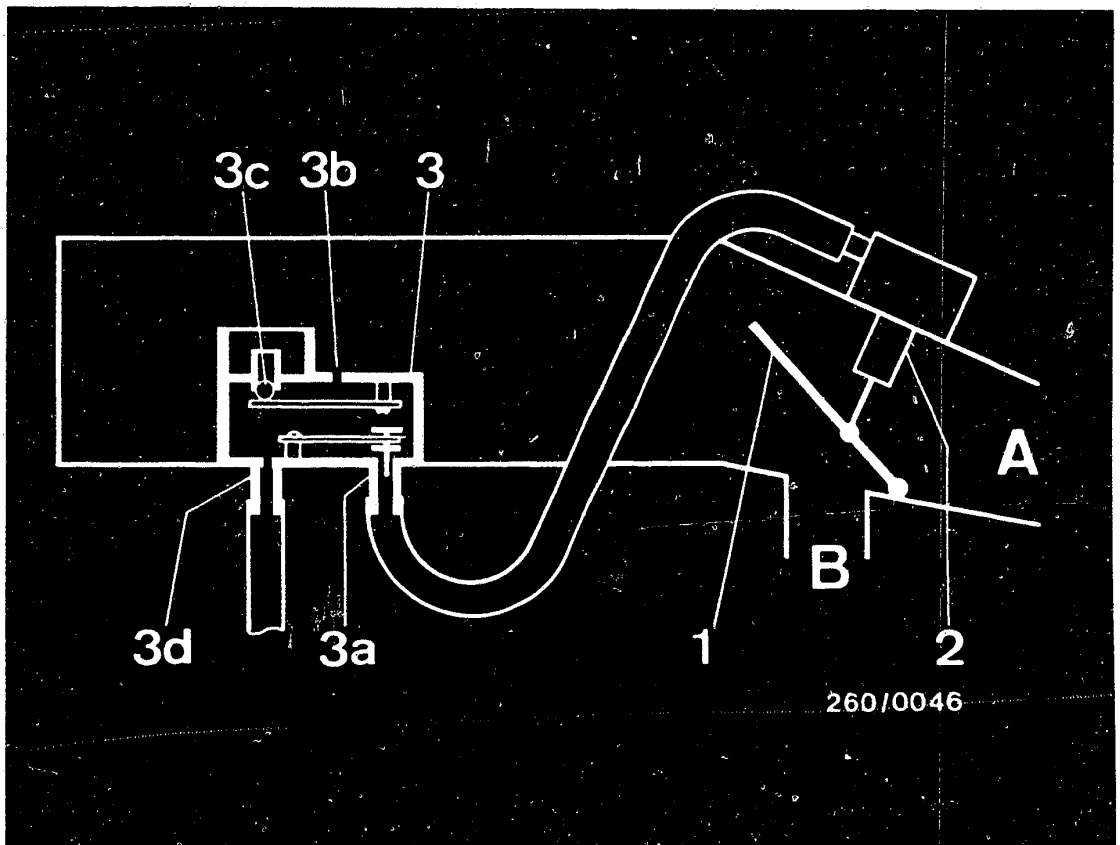
4. Fuel according to DIN ?

Use fuel to DIN standard.

5. Test fuel filter:

Withdraw fuel filter by means of M 3 screws  
(picture).

(Always renew filter when carrying out repairs to  
carburetor.)



260/0046

A = Cold-air duct

B = Hot-air duct

1 = Control flap

2 = Expansion element - at approx. + 5°C hot-air channel closed  
at approx. -20°C cold-air channel closed

3 = Double bimetal controller

\*3a = Non-return valve (opens at approx. +18°C)  
(brass tube)

3b= Pressurization bore  $0.5 \pm 0.05$  mm

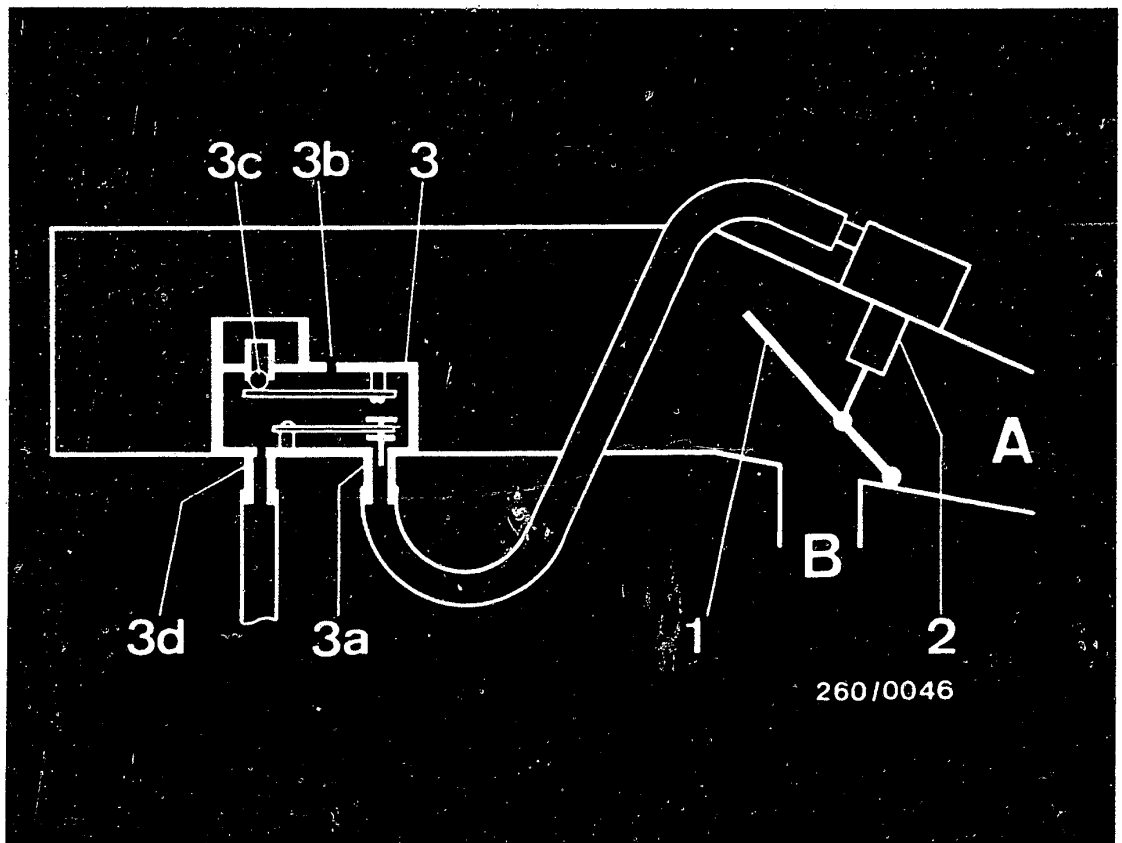
3c= Ball valve - closes below approx. +18°C  
opens above approx. +23°C

3d= Restriction  $1 \pm 0.1$  mm (plastic tube)

\* The valve must be so leak-tight that pressure differences last at least 2 - 3 minutes.

## 6. Test icing - intake air preheating





Intake air controlled as a function of load and temperature.

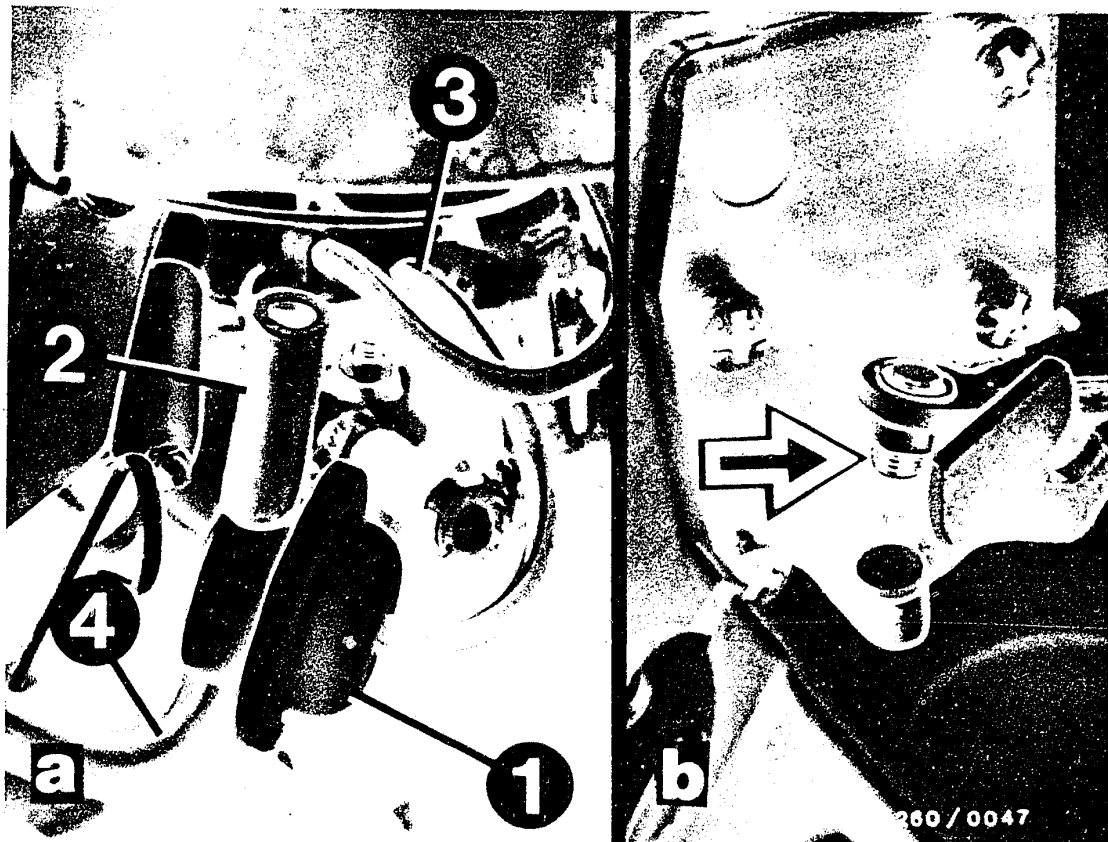
With engine cold (expansion element (2) at approx.  $-20^{\circ}\text{C}$ ) the control flap (1) must close the cold-air duct (A) entirely.

If necessary, test with refrigerant spray.

With the engine warm and running, the hot-air duct (B) must be closed.

If this position is not reached, there is a defect in the double bimetal controller (3) or expansion element (2)/vacuum unit.





## 7. Test overrun air valve

Disconnect hose (2) from air filter. Bring engine speed to  $3000 \text{ min}^{-1}$  and release throttle-valve part. The throttle-valve stop screw (Fig. b - arrow) must briefly come up against stop. At the same time a pressure difference must be noticeable at the hose (2).

If a pressure difference is not noticeable, check hoses for defect or test for throughflow.

Disconnect hose (3) from carburetor:

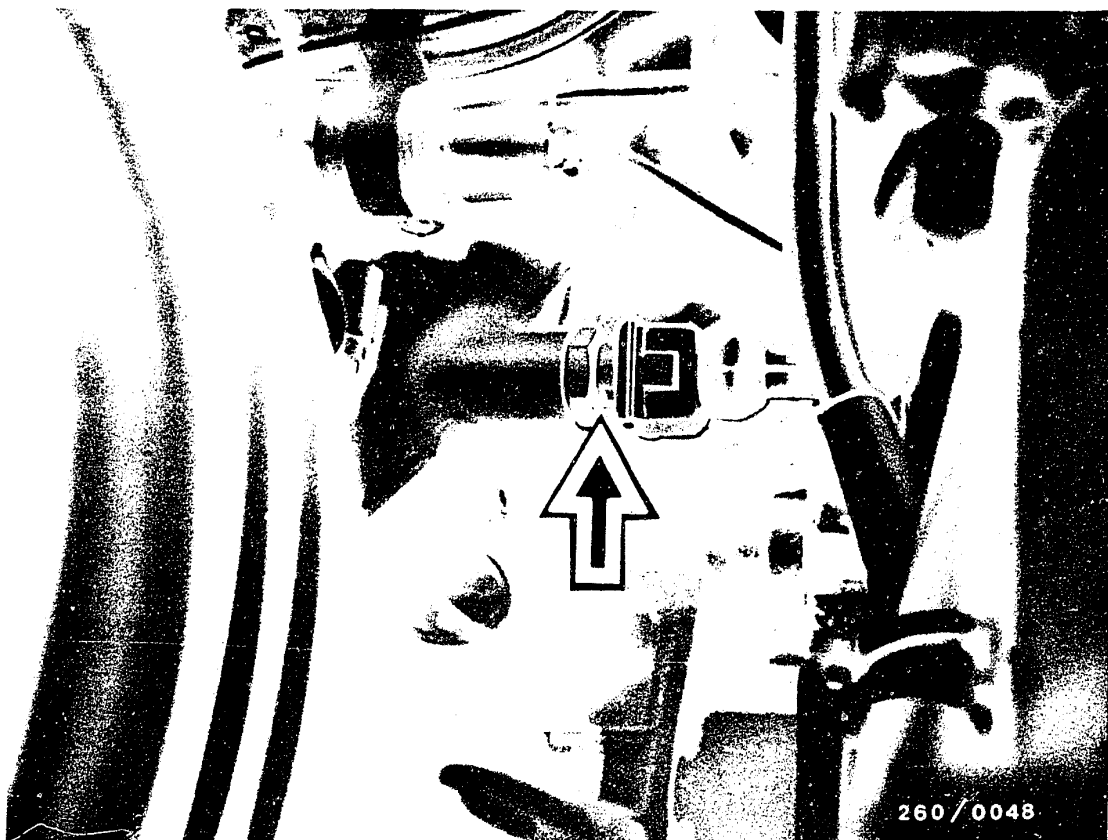
Overrun air valve must be closed (no throughflow between hose (2) and hose (4)).

Using vacuum pump, produce a pressure difference of at least 300 mbar at hose (3).

Overrun air valve must then be open.

Re-establish hose connections.





## 8. Test temperature sensor

Disconnect plug from temperature sensor (arrow).

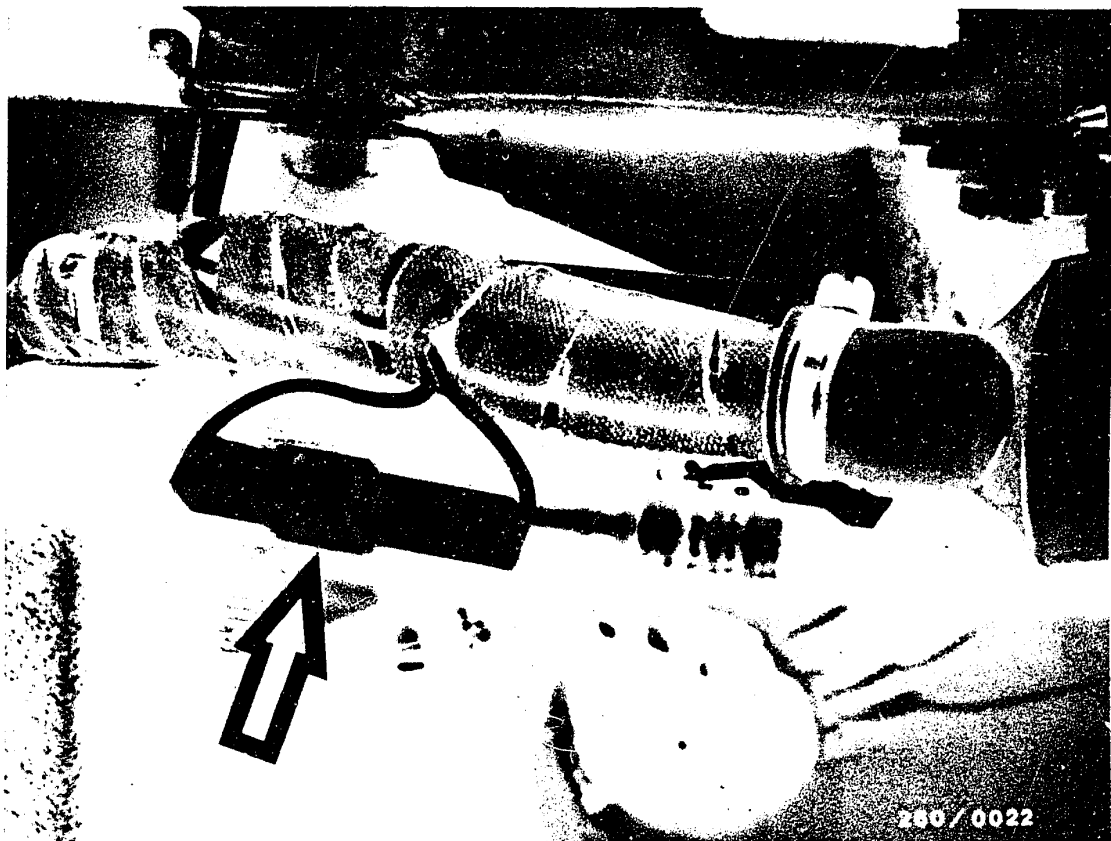
Measure resistance at the contacts of the temperature sensor. (Resistance depends on temperature.)

### Set value:

|           |   |               |
|-----------|---|---------------|
| At - 10°C | : | 8 ... 10.5 kΩ |
| + 20°C    | : | 2 ... 3 kΩ    |
| + 80°C    | : | 280 ... 360 Ω |







## 9. Test idle adjustment and CO

### Note:

The idle speed is regulated and not adjustable. If necessary, it can be increased by approx.  $100 \text{ min}^{-1}$  by connecting the connectors (arrow).

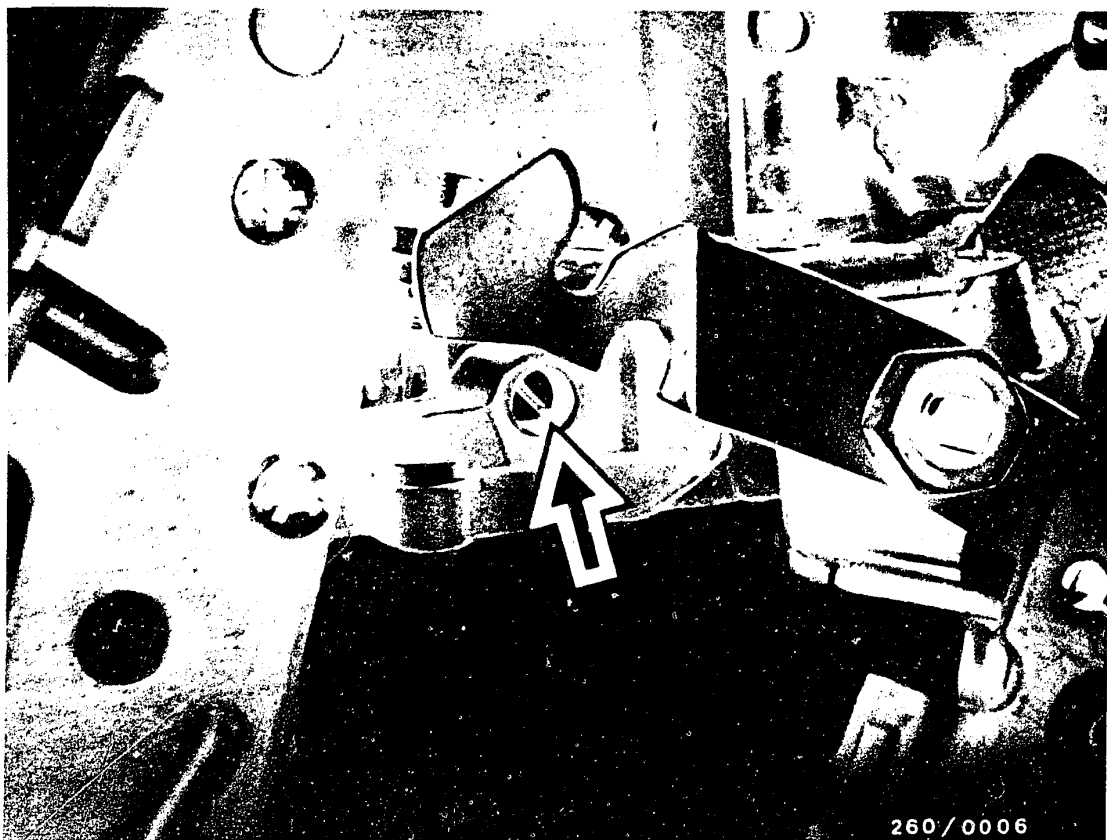
Beforehand, make sure of the following:

- Engine operating correctly
- Ignition system in order
- Control unit with wiring harness in order
- Oil temperature approx.  $+70^{\circ}\text{C}$
- Intake system leak-tight  
Clean air filter installed
- Electric loads switched off.



- Hose for crankcase breather disconnected
- Intake air preheating operating correctly
- Throttle actuation correct
- Overrun air valve operating correctly
- Tachometer and CO analyzer connected.





### CO adjustment

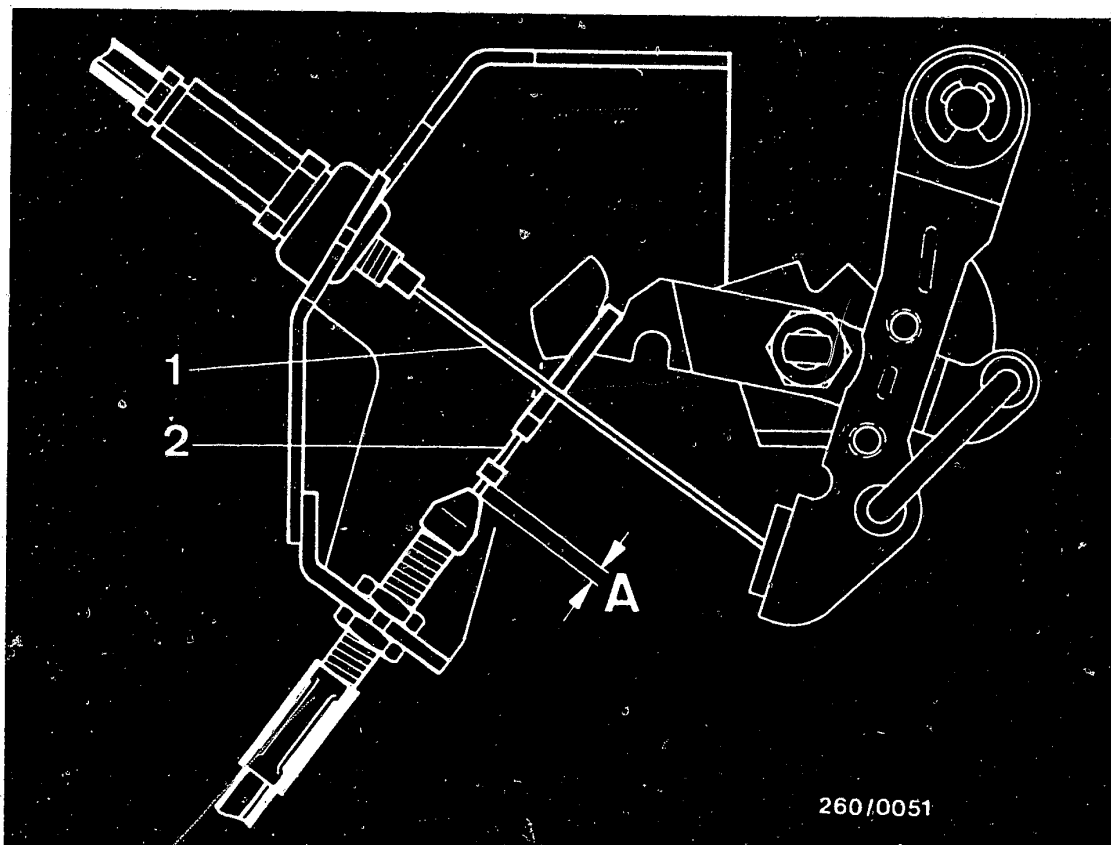
Exhaust-gas test using CO analyzer with engine at normal operating temperature and at idle speed.

Adjust CO concentration at idle-mixture-adjusting screw (arrow).

Idle speed:  $800 \pm 50 \text{ min}^{-1}$  ( $900 \pm 50 \text{ min}^{-1}$ )

CO setting:  $0.3 \dots 0.7 \text{ \% by vol. CO}$





260/0051

## 10. Test throttle actuation

### a) Bowden cable (1) (Bowden cable (2) only on Automatic)

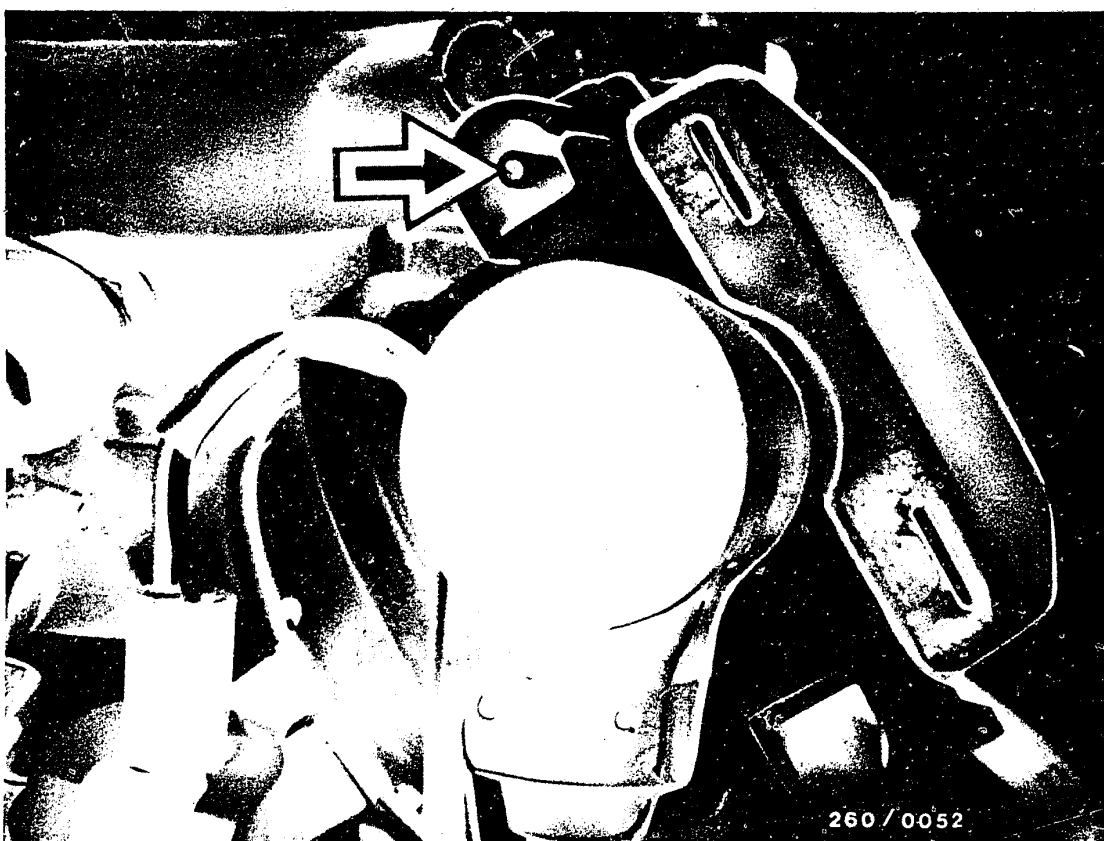
Bring throttle valve as follows into overrun position:

- With universal test adapter connected

Remove bridge between socket 1 and socket 2 and briefly bring engine to 1500 min<sup>-1</sup>.

The ram of the throttle-valve positioner is fully retracted.





- Without universal test adapter

Let engine idle.

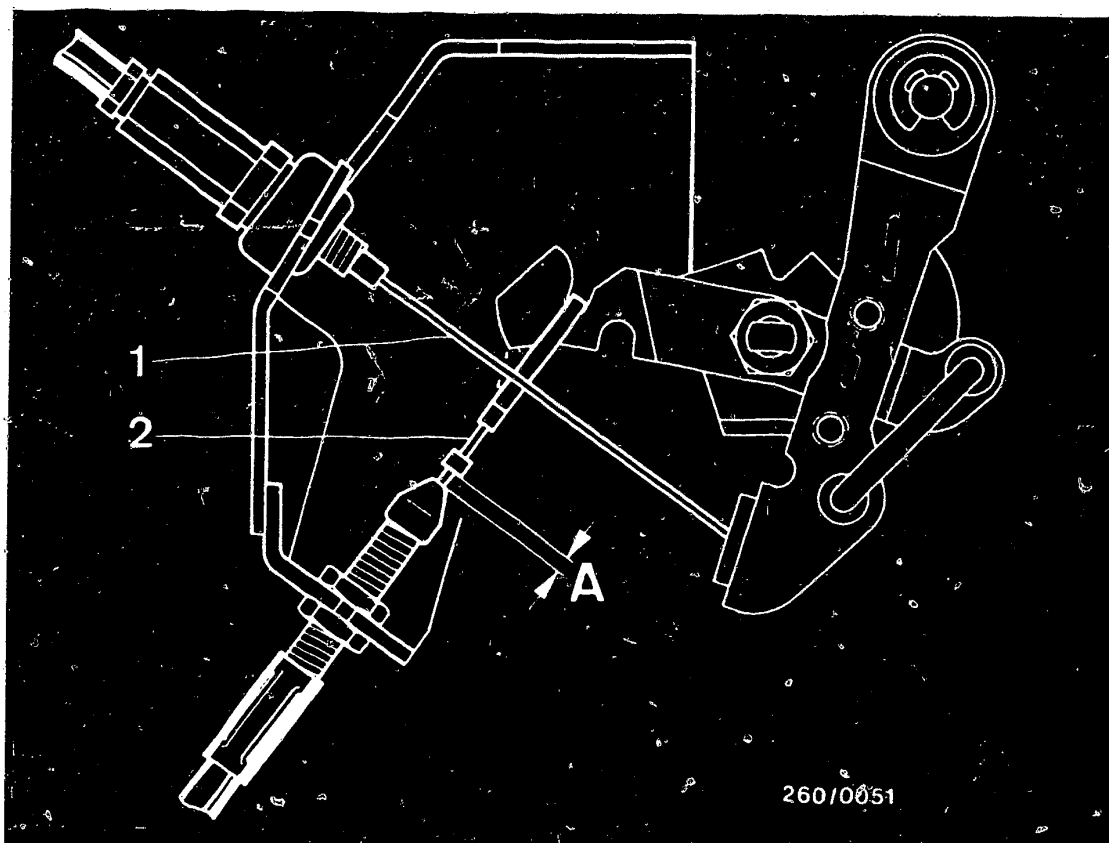
Seal off pressurizing side of throttle-valve positioner (arrow) and switch off ignition.

The ram of the throttle-valve positioner is fully retracted (overrun position).

Check whether throttle-valve stop screw is on stop.

Adjust Bowden cable so that there is a slight clearance.





Design in vehicles with automatic transmission

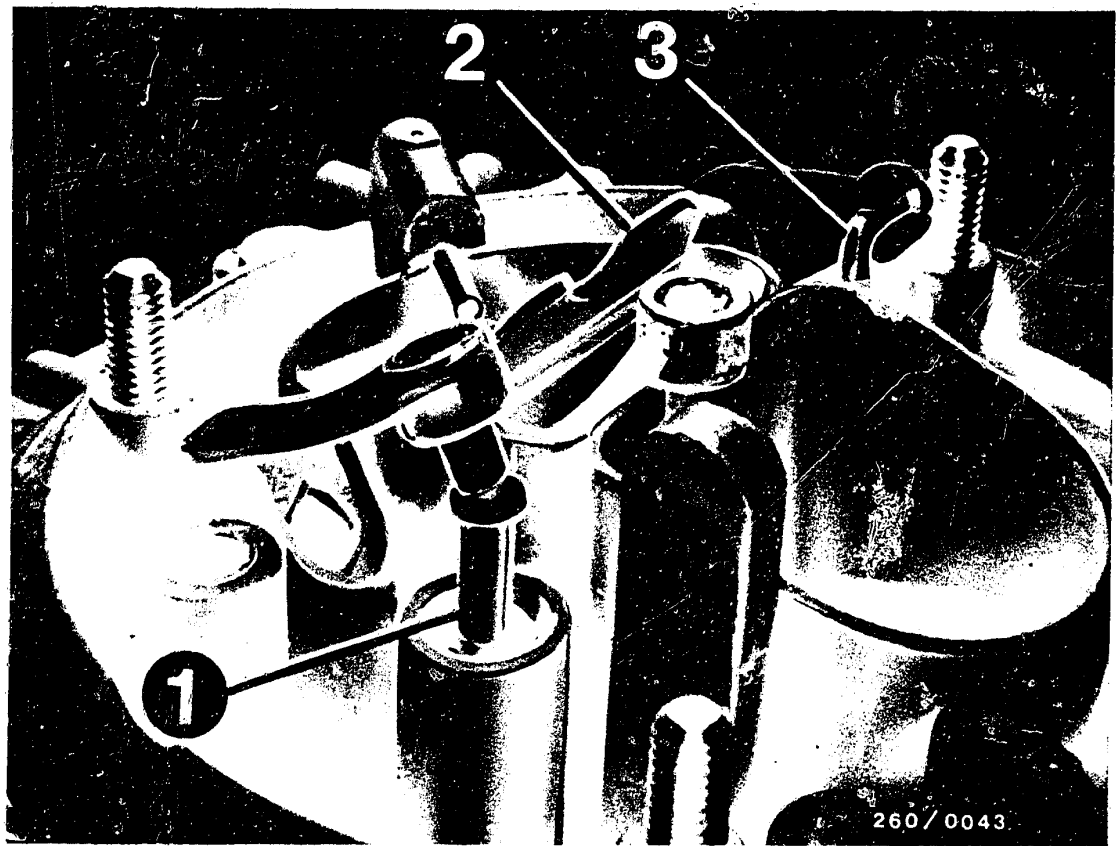
b) Bowden cable (2) additional for automatics:

Bring throttle valve into overrun position as in a).

Adjust Bowden cable (2) so that the clearance is  
 $A = 0.5 \pm 0.25 \text{ mm.}$

Re-establish hose connections.





11. Test freedom of movement of pre-throttle valve,  
pre-throttle controller, idle-air correction needle

Unscrew air filter.

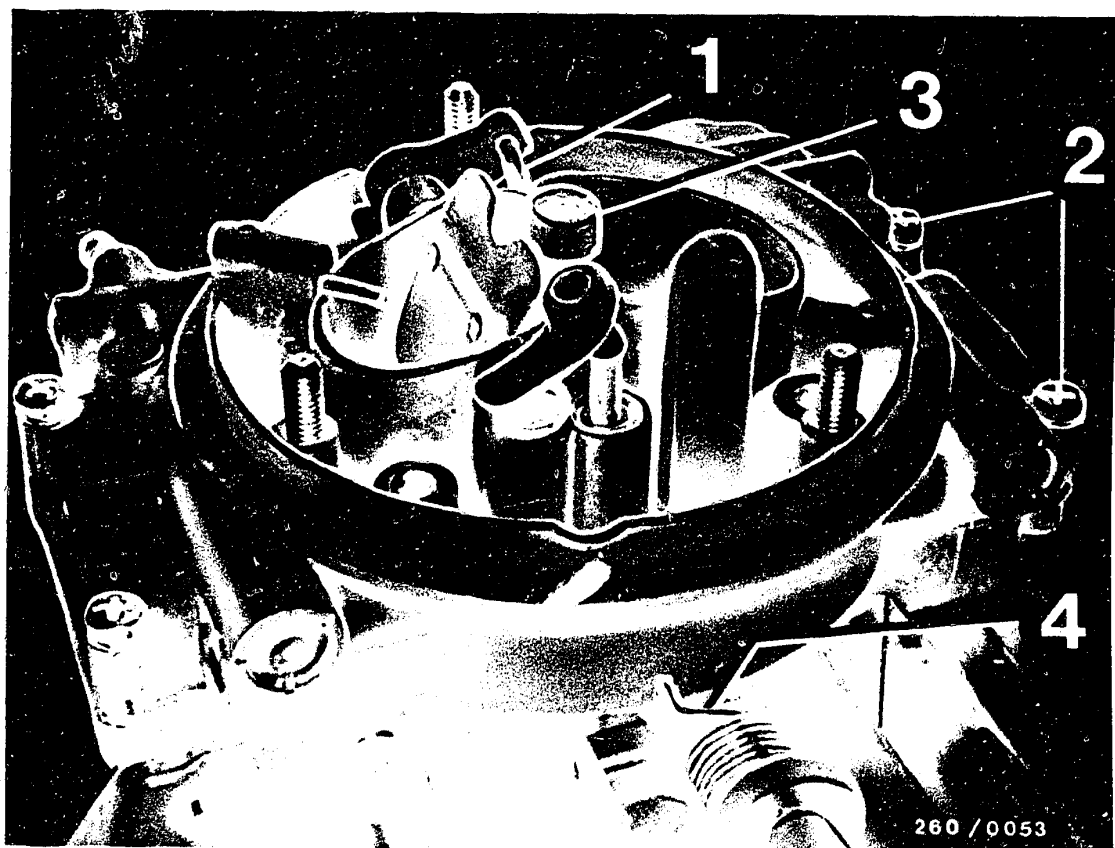
Ignition off.

Press idle-air correction needle (1) downward.

Watch for freedom of movement.

The pre-throttle valve must drop to by itself.





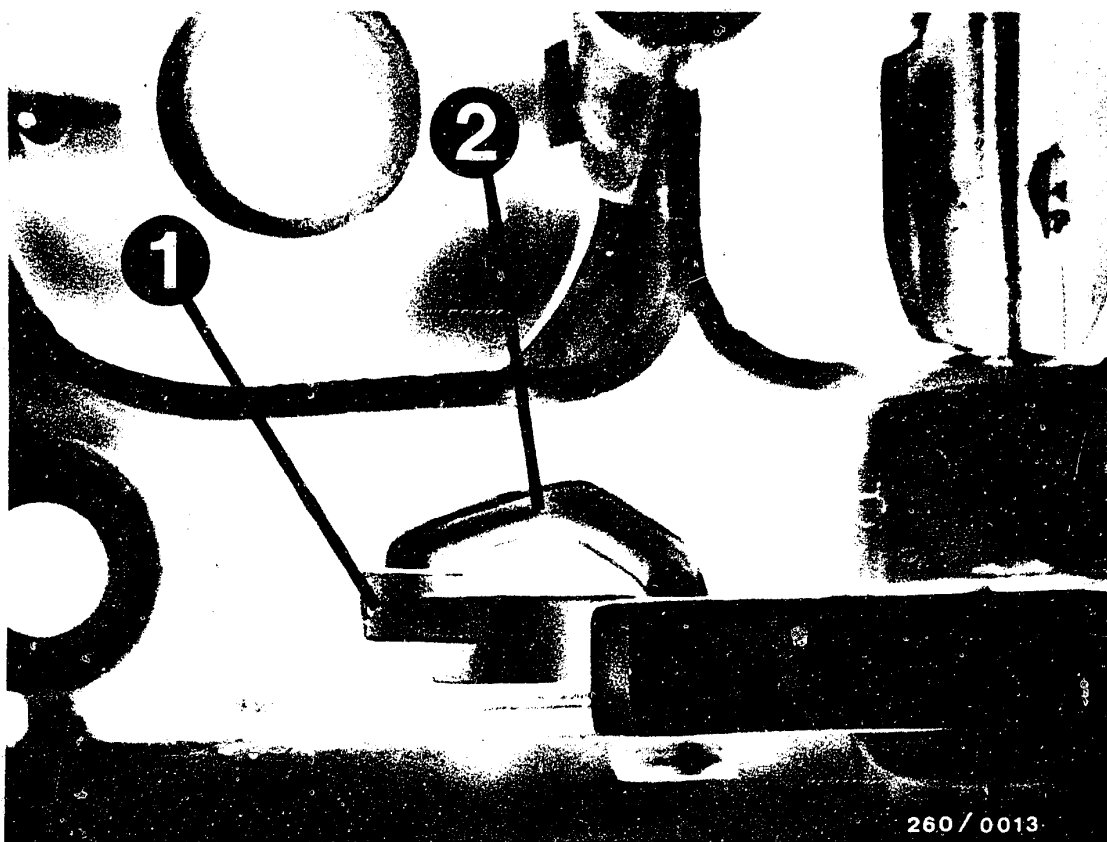
### Idle-air correction needle stiff/sticking:

Clean top part of carburetor.

- Unhook connecting rod (1).
- Loosen 4 recessed-head screws (2) and 1 hexagon-socket-head cap screw (3).
- Lift off top part of carburetor and at the same time unhook torsion spring (4).  
Pay attention to its preload in order to guarantee correct re-installation.  
Use new seals when assembling.



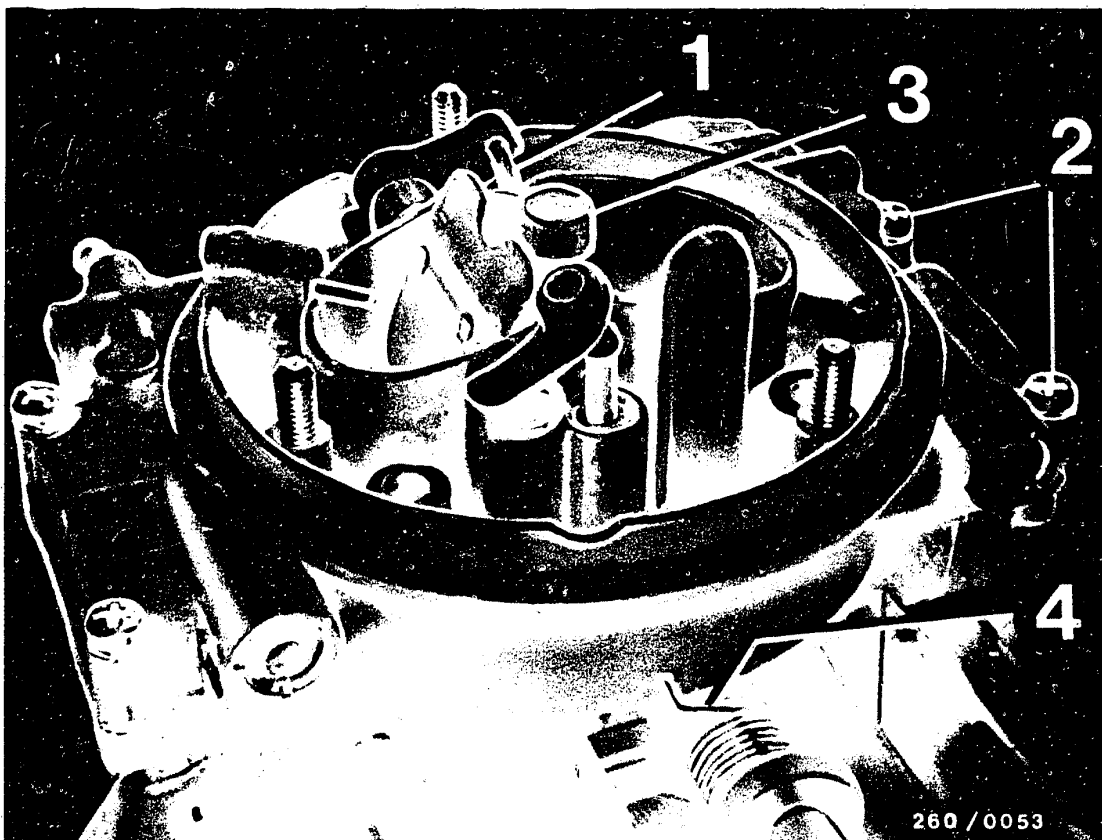




Pre-throttle valve stiff:

- Unhook connecting rod (2) and restore freedom of movement. (e.g. with WD 40 or Unispray "Termal"). Under no circumstances bend the connecting rod.
- Replace pre-throttle controller if stiff:  
Loosen 4 fastening screws and remove pre-throttle controller.  
When installing the pre-throttle controller, pay attention to its locating as well as to the correct position of the lever (1) when inserting the connecting rod.





## 12. Check float (level), float needle, fuel valves:

### Remove top part of carburetor

Unhook connecting rod (1).

Loosen 4 recessed-head screws (2) and 1 hexagon-socket-head cap screw (3).

Lift off top part of carburetor and at the same time unhook torsion spring (4).

Pay attention to its preload in order to guarantee correct re-installation.

### Check float (fuel level) (Stages I and II)

The fuel level is not adjustable, it is obtained by using a float which is in good condition.

Weight of float:  $6.2 \pm 0.3$  g.



Test float needle:

Move float weight (stages I and II) and check whether float needle is in proper working order.  
If necessary, replace float needle.

Test fuel valves:

Leak test on stage I

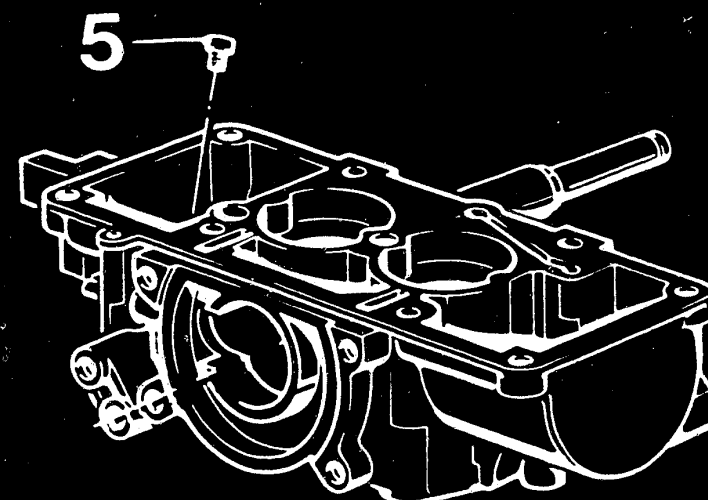
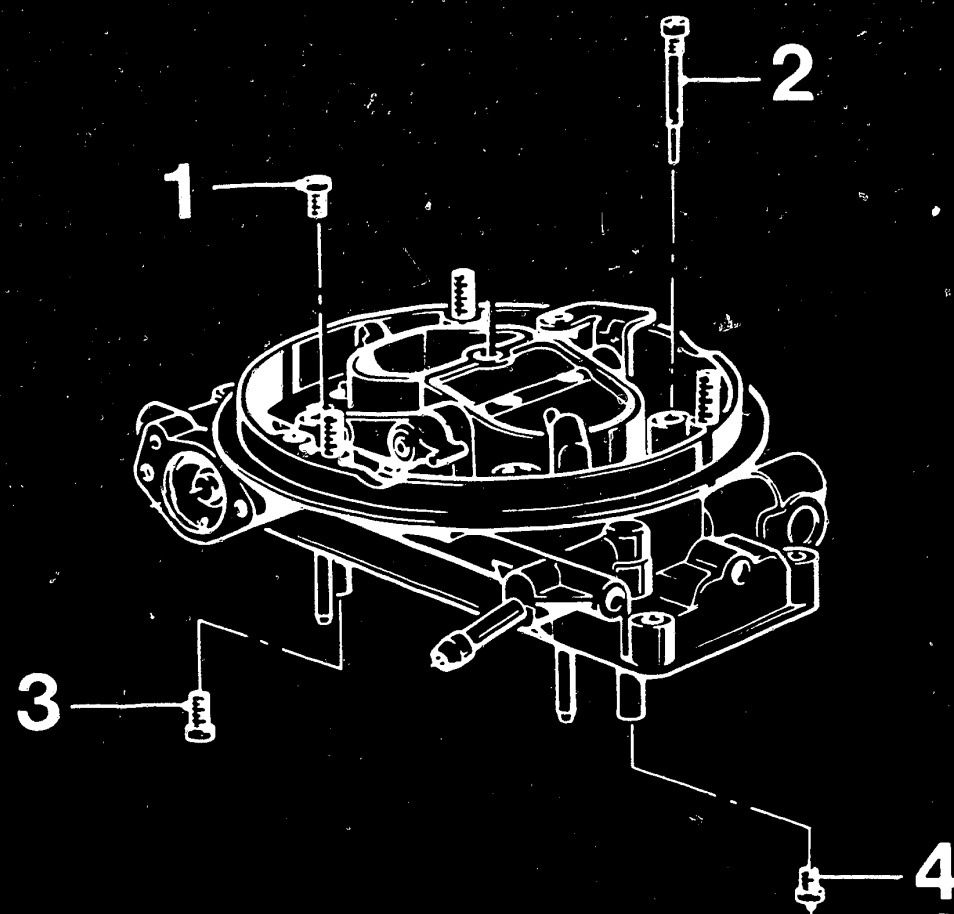
Connect vacuum pump to fuel inlet.  
Raise float and generate pressure difference.

Leak test on stage II

Connect vacuum pump to stage II cutoff valve vacuum bore and generate pressure difference.

If no pressure difference possible, clean valves and replace if necessary.





260/0054

1 = Off-idle air jet - stage 2 - X 180  
 2 = Idle jet 47.5  
 3 = Main jet - stage 2 - X 110

4 = Main jet - stage 1 - X 120  
 5 = Off-idle fuel jet 100

Venturi (stage 1) = 24 mm  
 Venturi (stage 2) = 28 mm  
 Float needle valve with pin - stage 1 -  
 P 2.0  
 Float needle valve with pin - stage 2 -  
 2.0

### 13. Test jet sizes

Remove top part of carburetor: unhook connecting rod (between pre-throttle controller and pre-throttle). Loosen 4 recessed-head screws and 1 hexagon-socket-head cap screw. Lift off top part of carburetor and at same time unhook torsion spring. Pay attention to its preload in order to guarantee correct re-installation.

**G6**

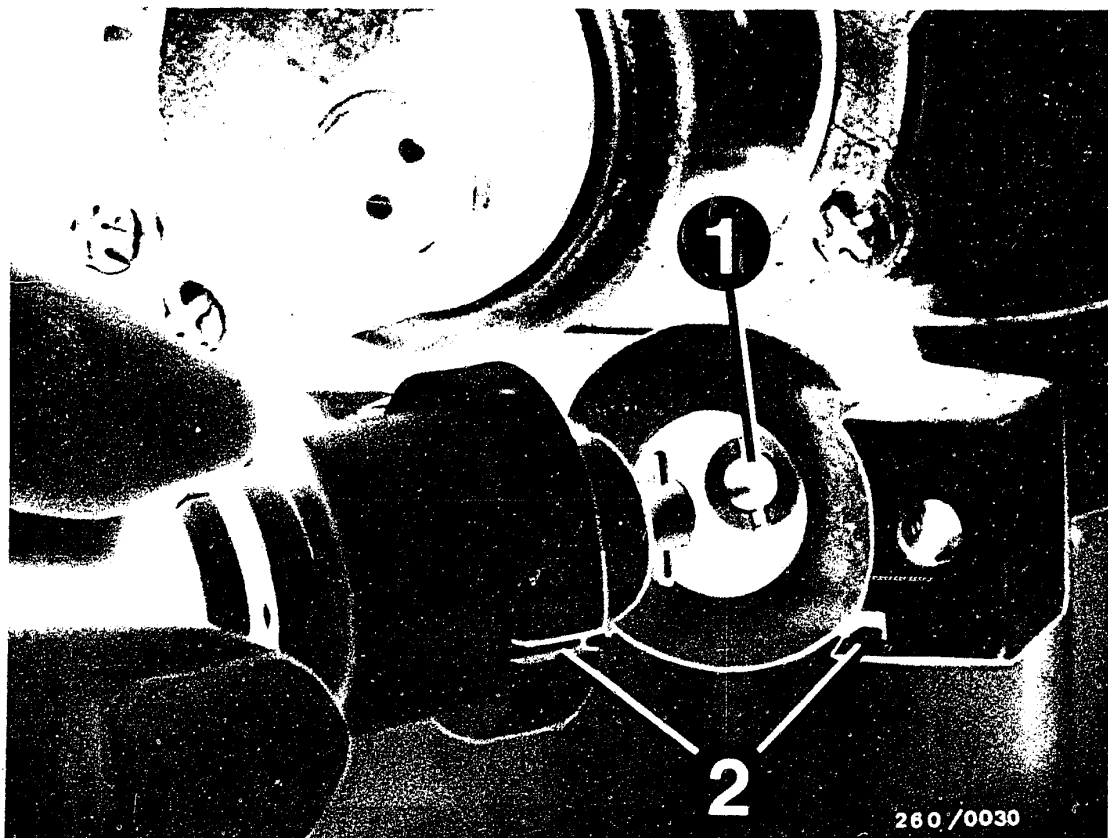
Test jet sizes  
 BMW 316, 518



**G7**

Test jet sizes  
 BMW 316, 518





#### 14. Test throttle shaft for excessive play

If throttle shaft worn, replace throttle-valve part: remove air filter. Disconnect all plugs and hose connections, to the extent necessary, from carburetor. Remove carburetor. Unscrew throttle-valve part. Remove throttle-valve potentiometer (pay attention to connector (1)). The throttle valve (stage I) is set to its basic setting at the factory and must not be adjusted. Mount throttle-valve potentiometer on new throttle-valve part. When inserting, pay attention to correct seating of connector (1) and locating slits (2). Mount throttle-valve part on carburetor (use new seal). Mount carburetor. Re-establish electrical connections and hose connections. Connect stage II vacuum unit to stage II throttle valve.





Adjust control range of throttle-valve positioner:

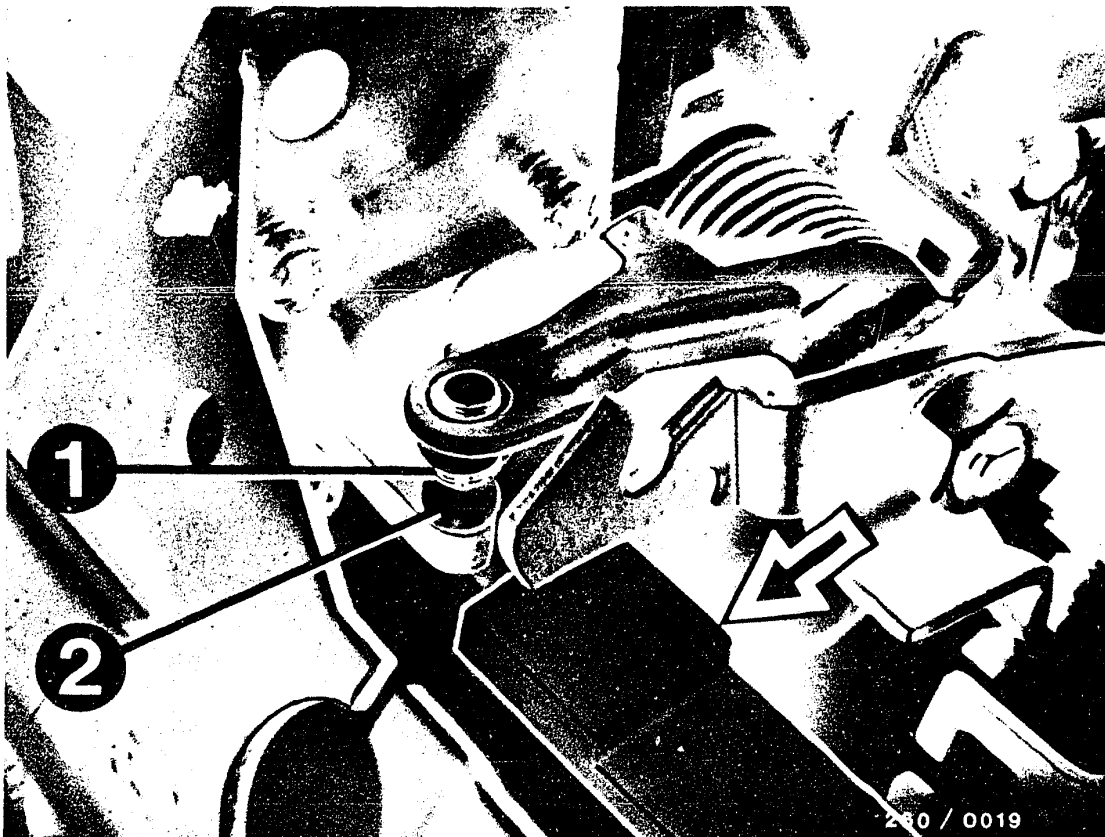
Disconnect plug from temperature sensor.

Bridge poles of plug (short-circuit). This simulates a warm engine.

Switch on ignition (do not start engine).

Using vacuum pump, produce a constant pressure difference of approx. 250 mbar at the evacuating valve (picture) while adjusting. (The ram of the throttle-valve positioner moves into a position-regulated position.)



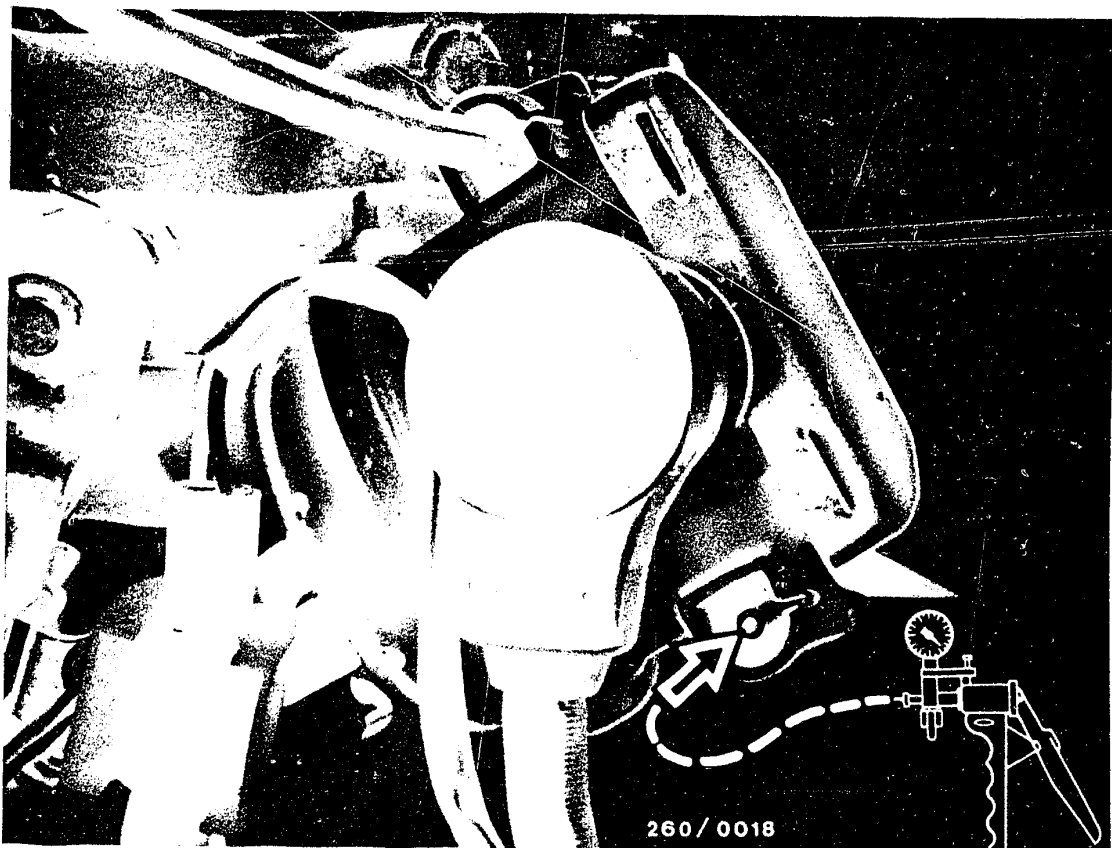


In this position a feeler gauge of 6.84 mm must be able to glide between throttle-valve stop screw (1) and stop (2).

Adjust at idle stop screw (tear-off screw).

- Break off head of idle stop screw.
- Check idle speed.





15. Check adjustment of throttle-valve part (stage I)

Remove air filter.

Disconnect plug from temperature sensor (on intake manifold).

Bridge poles of plug (short-circuit). This simulates a warm engine.

Switch on ignition (do not start engine).

Using vacuum pump, produce a constant pressure difference of approx. 250 mbar at the evacuating valve (picture) while adjusting. (The ram of the throttle-valve positioner moves into a position-regulated position.)





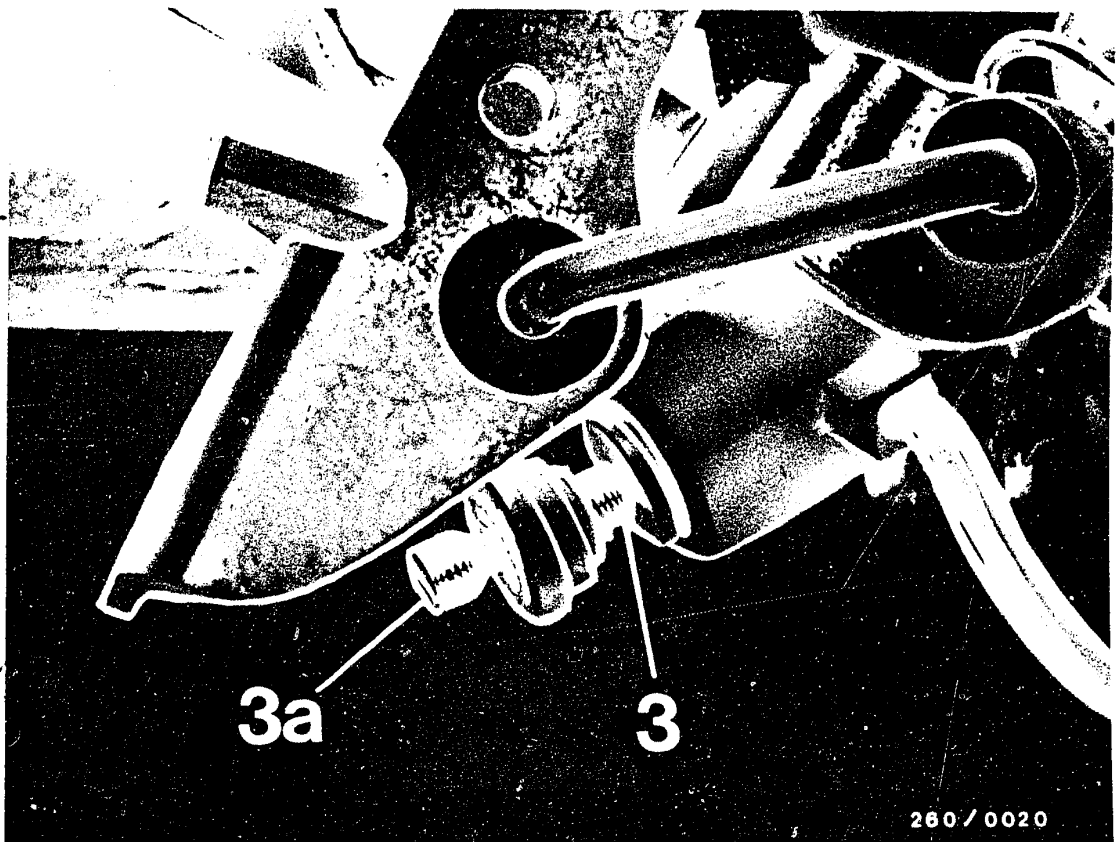


In this position the feeler gauge (arrow) must be able to glide between throttle-valve stop screw (1) and stop (2).

If the distance between the throttle-valve stop screw and the stop (2) is too large or too small, unscrew idle stop screw and replace it with a new one.

Using vacuum pump, produce a constant pressure difference of approx. 250 mbar with the ignition on. Ram of throttle-valve positioner moves into position-regulated position.





Set gap with new idle stop screw (3) so that feeler gauge can glide between throttle-valve stop screw and stop.

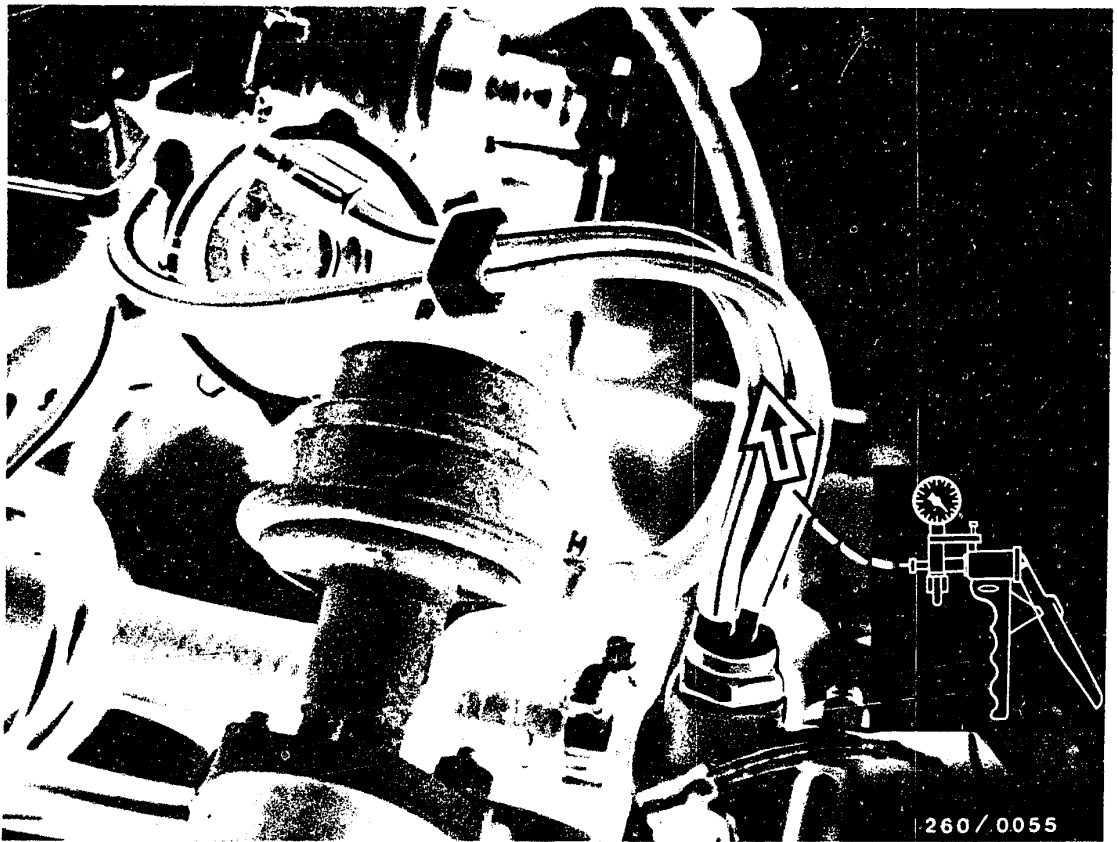
Break off head of idle stop screw (3a).

Establish hose connections.

Connect plug to temperature sensor.

Check idling.

Mount air filter.



## 16. Check stage II vacuum unit and thermo-valve

### Check vacuum unit:

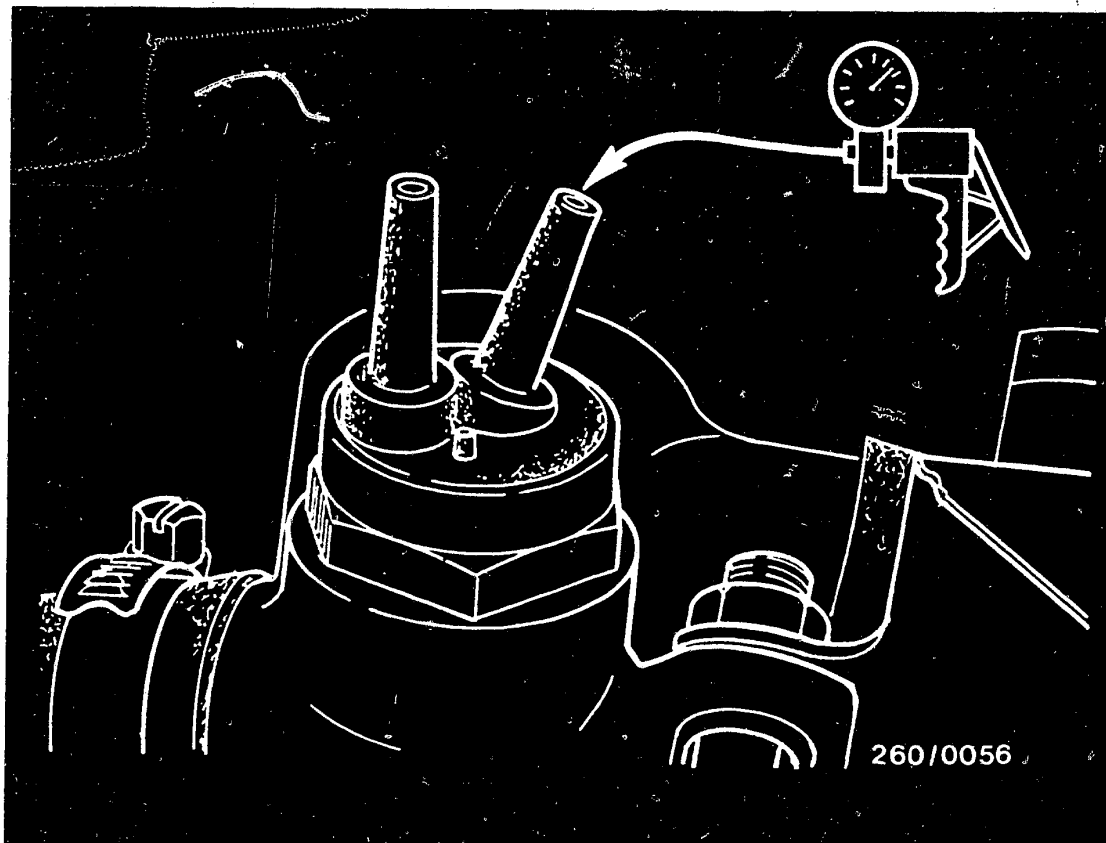
Test vacuum connection on carburetor for throughflow.

Check connecting hoses.

Connect vacuum pump and generate a pressure difference of approx. 300 mbar.

If the pressure difference can be seen to drop, replace vacuum unit.'





### Check thermo-valve

#### Note:

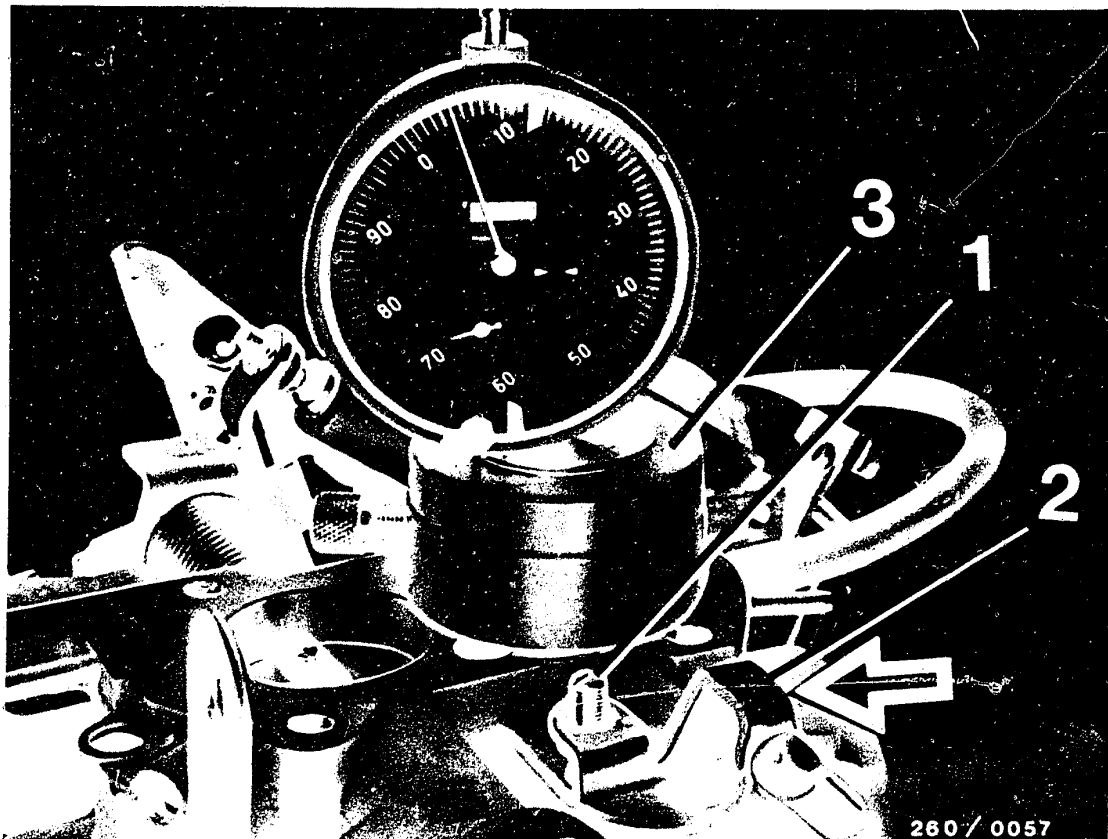
A restriction bore in the thermo-valve also opens a bypass channel even when it is closed (small flow of leakage air).

Test thermo-valve with vacuum pump.

Throughflow: : above approx.  $+58^{\circ}\text{C}$  (engine warm)

No throughflow : below approx.  $+48^{\circ}\text{C}$  (engine cold)





### 17. Check stage II basic setting

Remove air filter.

Disconnect all plugs and hose connections, to the extent necessary, from the carburetor.

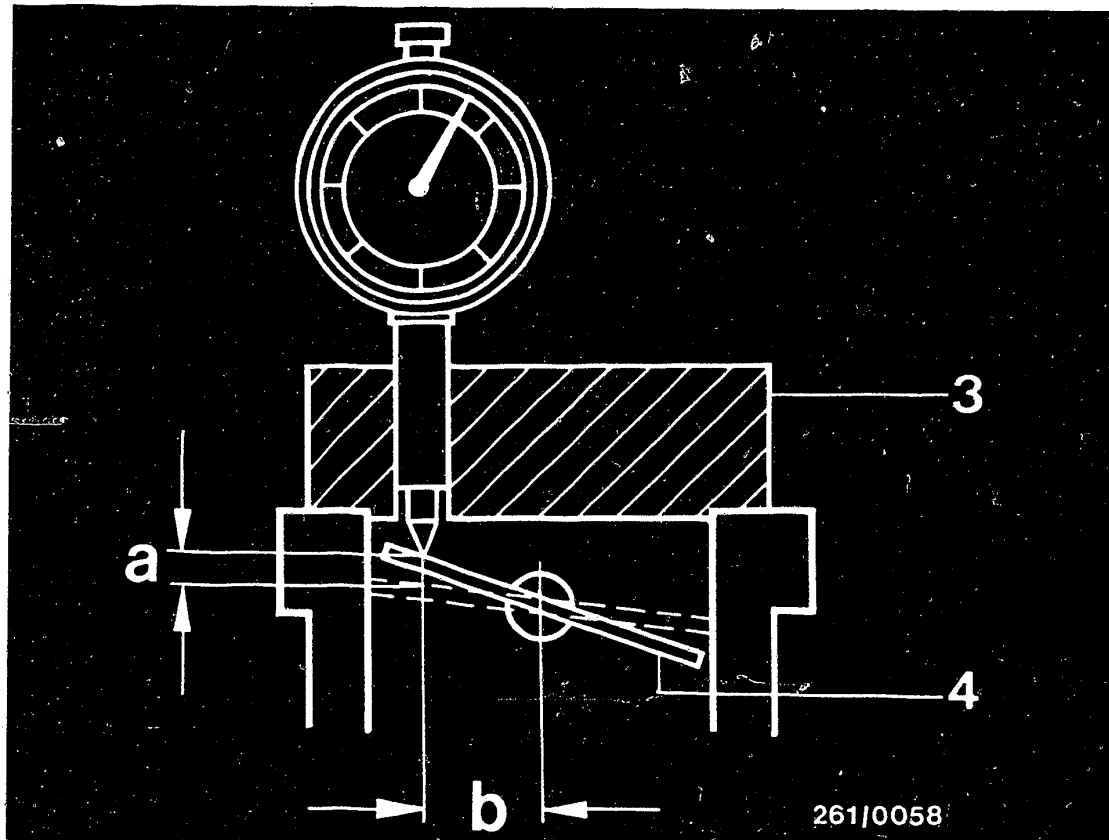
Remove carburetor.

Unscrew throttle-valve stop screw (1) until it is no longer up against the stop.

Press throttle lever (2) lightly in direction of arrow.

Mount measuring tool (3).





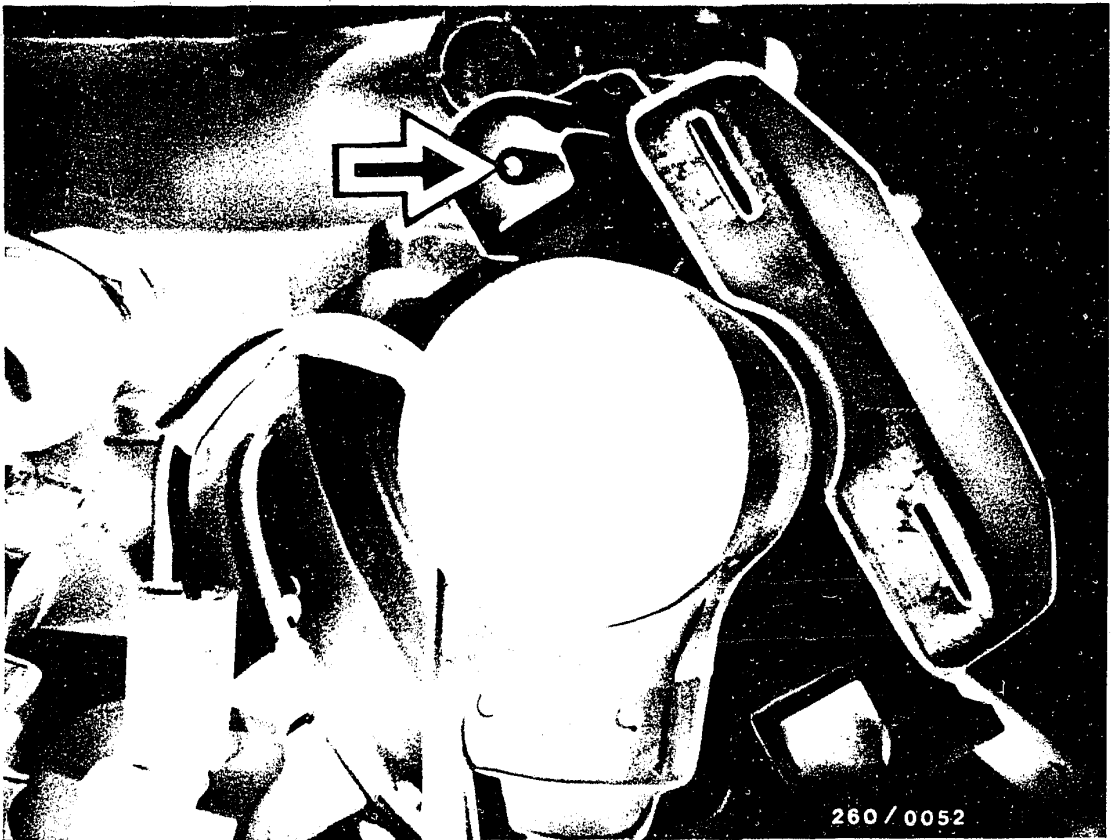
By turning the measuring tool (3), establish the highest point of the throttle valve (dimension "b").

Set dial indicator to "0".

Set dimension "a" with throttle-valve stop screw.

$$\underline{a = 0.05 \pm 0.02 \text{ mm}}$$





### 18. Test release and positive return - stage II

To do this, bring throttle valve into overrun position as follows:

With universal test adapter connected:

Remove bridge between socket 1 and socket 2 and briefly bring engine to  $> 1500 \text{ min}^{-1}$ .

The ram of the throttle-valve positioner is fully retracted.

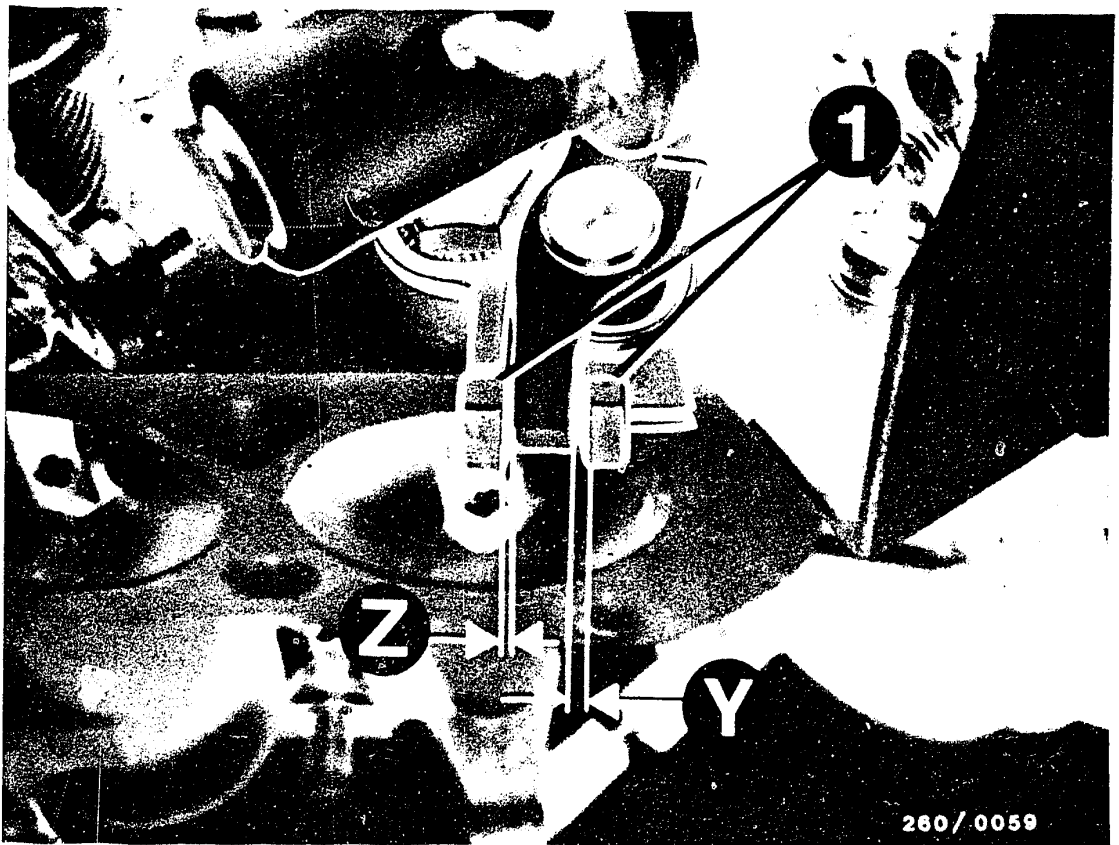
Without universal test adapter:

Let engine idle.

Seal pressurizing side of throttle-valve positioner (arrow) and switch off ignition. The ram of the throttle-valve positioner is fully retracted (overrun position).

Check whether throttle-valve stop screw is at stop.





Note:

For better working, it may be necessary to remove air filter and carburetor.

Tightening torque for carburetor mounting: 8...10 Nm

Set dimensions "Y" and "Z" by bending the fork (1).

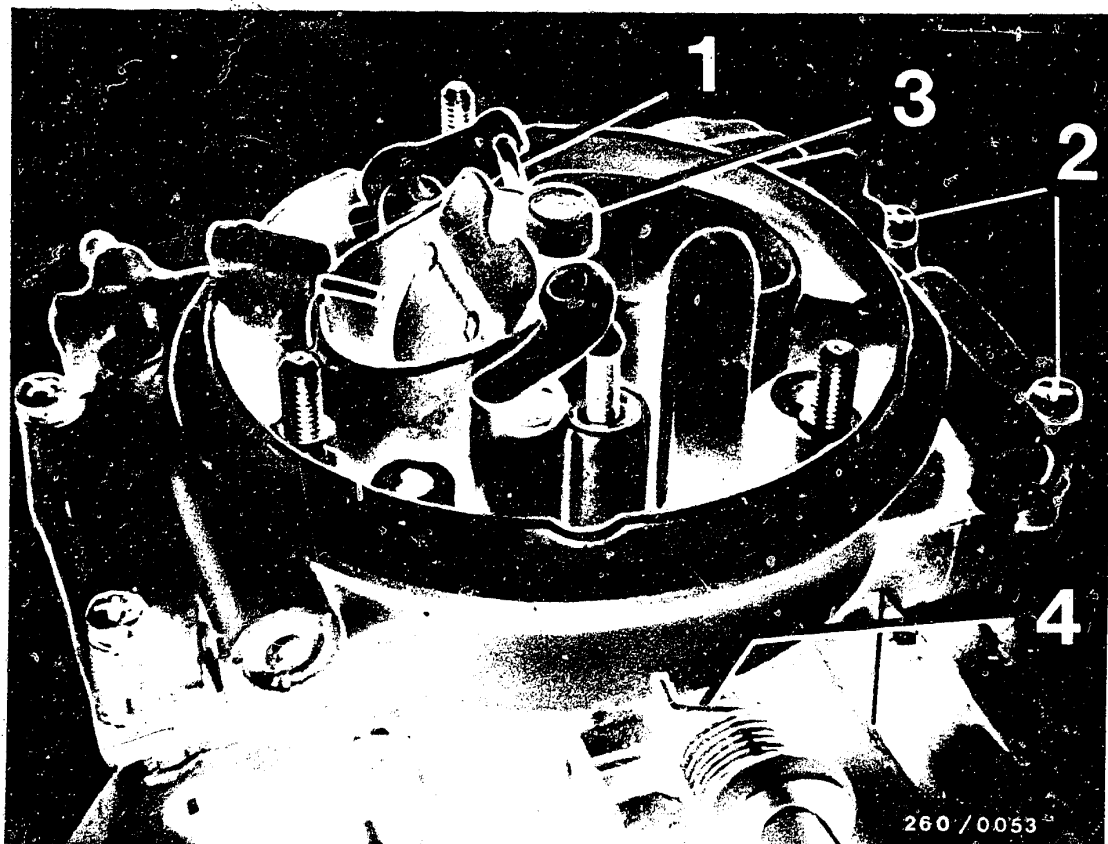
Make the measurement at the narrowest point:

$$Y = 1.3 \dots 1.7 \text{ mm}$$

$$Z = 0.1 \dots 0.5 \text{ mm}$$







### 19. Dirt in carburetor/corrosion

Disconnect all plugs and, to the extent necessary, hose connections from the carburetor.

Remove carburetor.

Unscrew top part of carburetor.

Unhook connecting rod.

Loosen 4 recessed-head screws (2) and 1 hexagon-socket-head cap screw (3).

Remove top part of carburetor and at the same time unhook the torsion spring (4).

Pay attention to its spring preload in order to guarantee correct re-installation.

Unscrew throttle-valve part.

**H1**

Dirt in carburetor/corrosion

BMW 316, 518



Unscrew all electrical components (pay attention to connector of throttle-valve potentiometer).

Remove all plastic parts (including strainer in fuel inlet), but not plastic parts of carburetor top part (setting of pre-throttle valve must not be changed!)

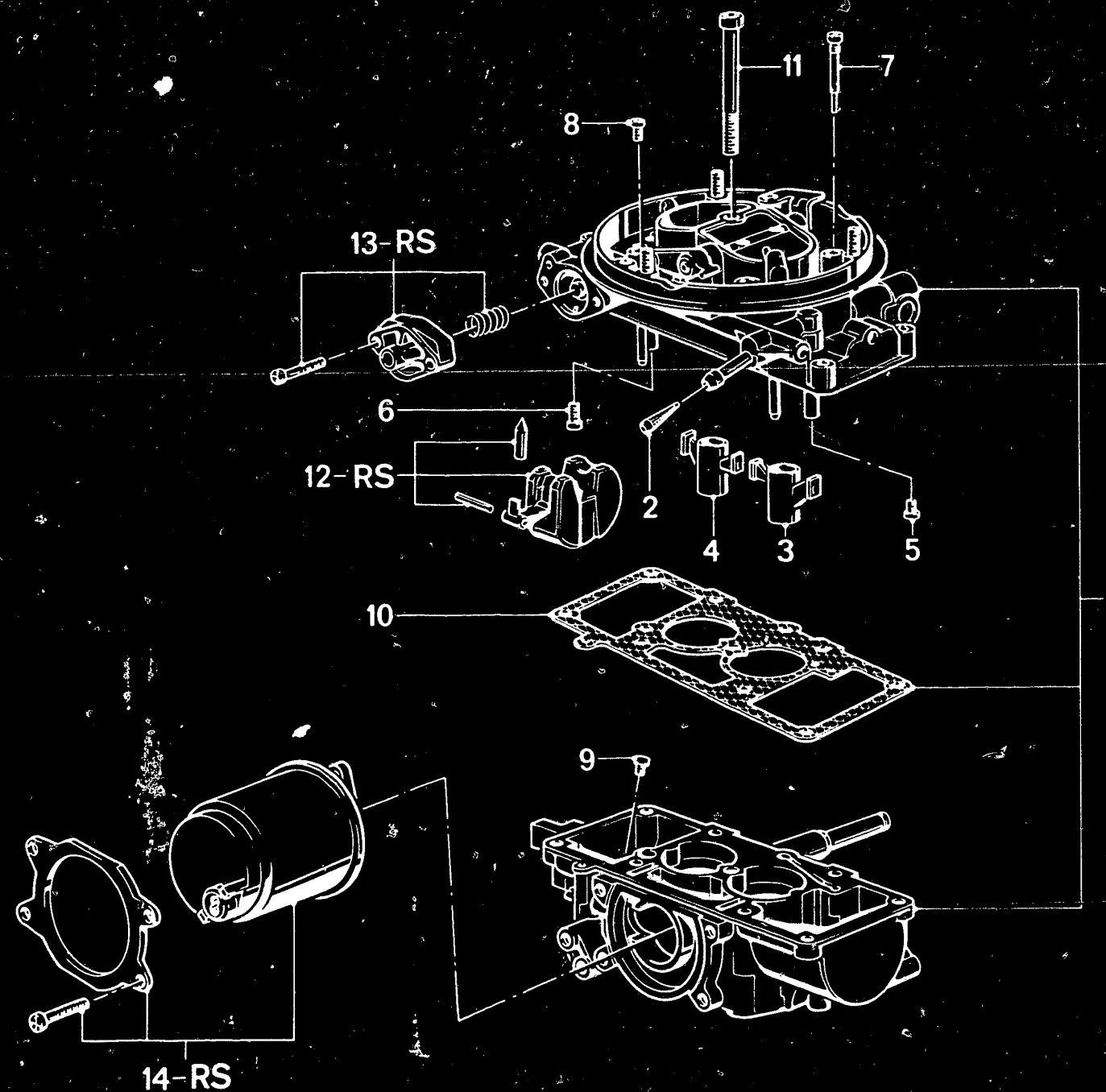
Clean pressure-die-cast and steel parts in suitable carburetor cleaning agent.

After cleaning, wash all parts with white petroleum spirit (DIN 51 632).

Blow out bores and ducts with compressed air.

Check all moving parts for freedom of movement.





60/0060

### Construction of ECOTRONIC carburetor

1 = Float chamber, carburetor  
cover, seal

2 = Strainer

3 = Boost venturi

4 = Boost venturi

5 = Main jet - stage I

6 = Main jet - stage II

7 = Idle jet

8 = Off-idle air jet

9 = Off-idle fuel jet

10 = Gasket

11 = Fillister-head screw

12 = Float

13 = Valve

14 = Pre-throttle controller

**H3**

Dirt in carburetor/corrosion

BMW 316, 518

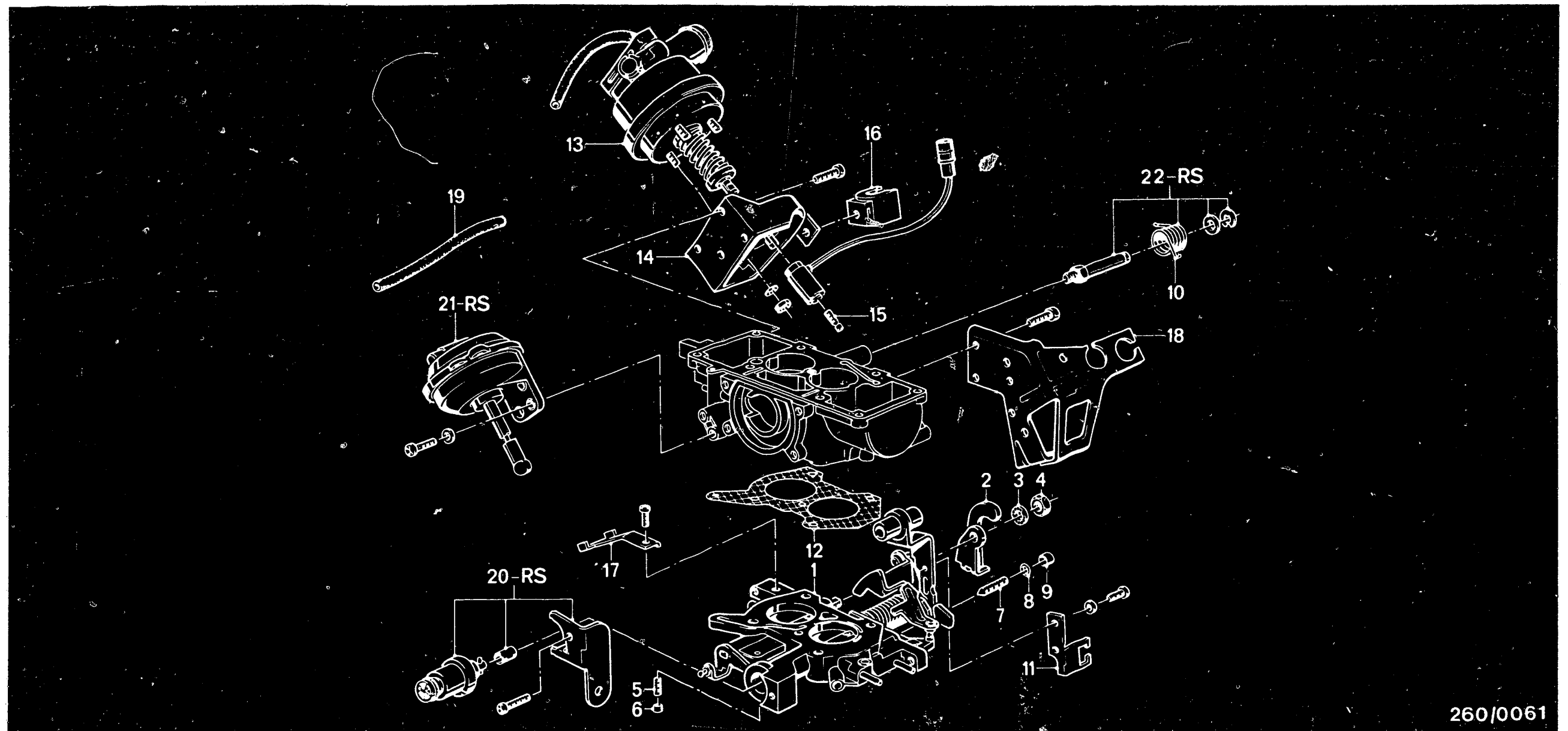


**H4**

Dirt in carburetor/corrosion

BMW 316, 518





260/0061

### Construction of ECOTRONIC carburetor (continued)

- |                            |                                       |                                |                                   |
|----------------------------|---------------------------------------|--------------------------------|-----------------------------------|
| 1 = Throttle-valve housing | 7 = Idle-mixture-adjusting screw      | 13 = Throttle-valve positioner | 19 = Vacuum hose                  |
| 2 = Lever                  | 8 = O-ring                            | 14 = Bracket                   | 20 = Throttle-valve potentiometer |
| 3 = Tooth lock washers     | 9 = Plug                              | 15 = Headless setscrew         | 21 = Stage II vacuum unit         |
| 4 = Hexagon nut            | 10 = Torsion spring                   | 16 = Holder                    | 22 = Bearing pin                  |
| 5 = Headless setscrew      | 11 = Actuating lever (cruise control) | 17 = Holder                    | RS = Repair kit                   |
| 6 = Cap                    | 12 = Seal                             | 18 = Bracket                   |                                   |

**H5**

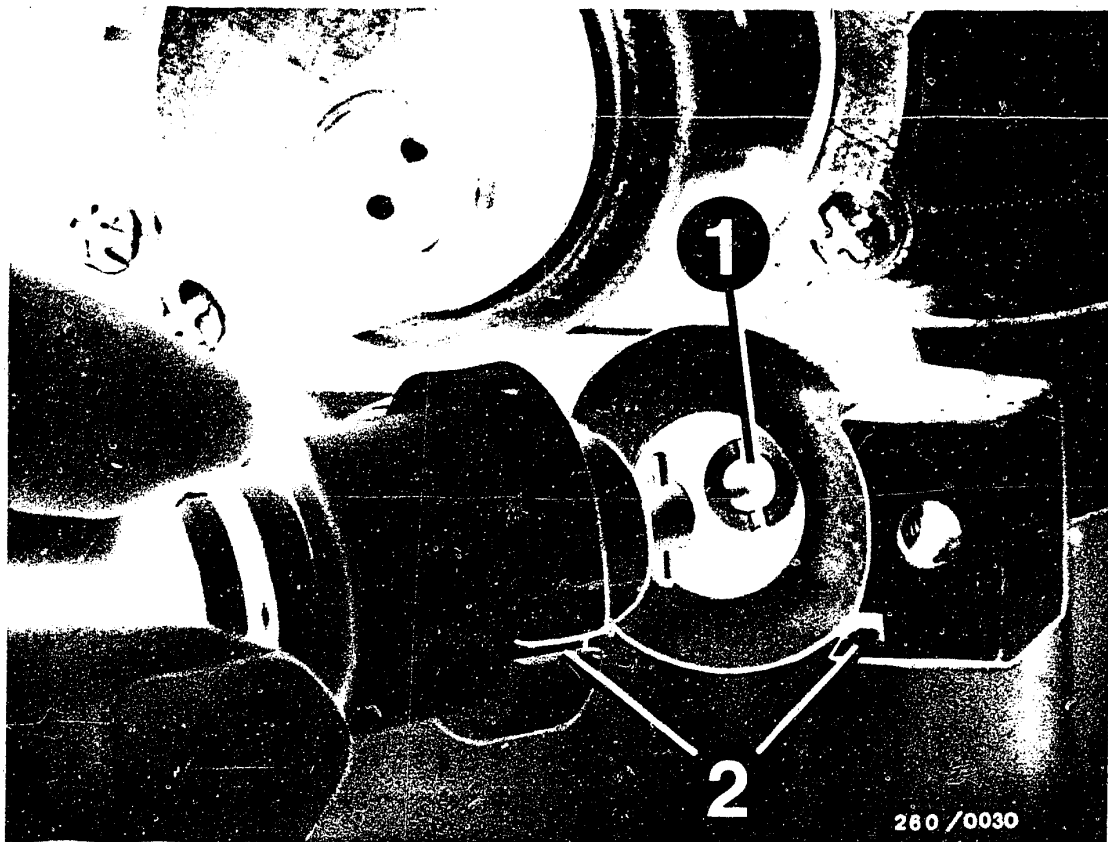
Dirt in carburetor/corrosion  
BMW 316, 518



**H6**

Dirt in carburetor/corrosion  
BMW 316, 518





### Assembling the carburetor

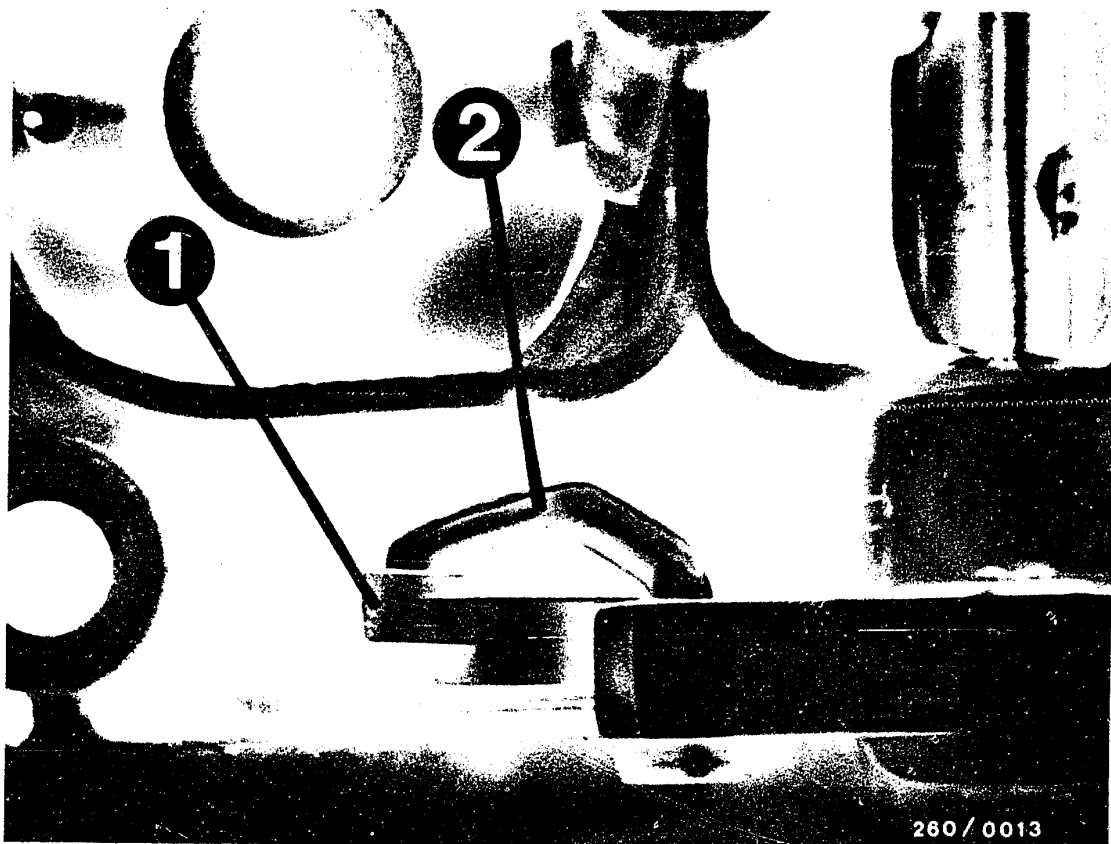
Pay attention to connector (1) and locating (2) when mounting the throttle-valve potentiometer.

**H7**

Dirt in carburetor/corrosion

BMW 316, 518





260 / 0013

Pay attention to locating when mounting the pre-throttle controller. Install connecting rod (2) to lever (1) of pre-throttle controller.

Spray carburetor with WD 40 or Unispray "Termal" against corrosion.

Mount carburetor.

Tightening torque for carburetor mounting: 8...10 Nm

Re-establish all electrical connections and hose connections.

Mount air filter.

Check idle CO.

If necessary, set to

0.3 ... 0.7 % by vol. CO

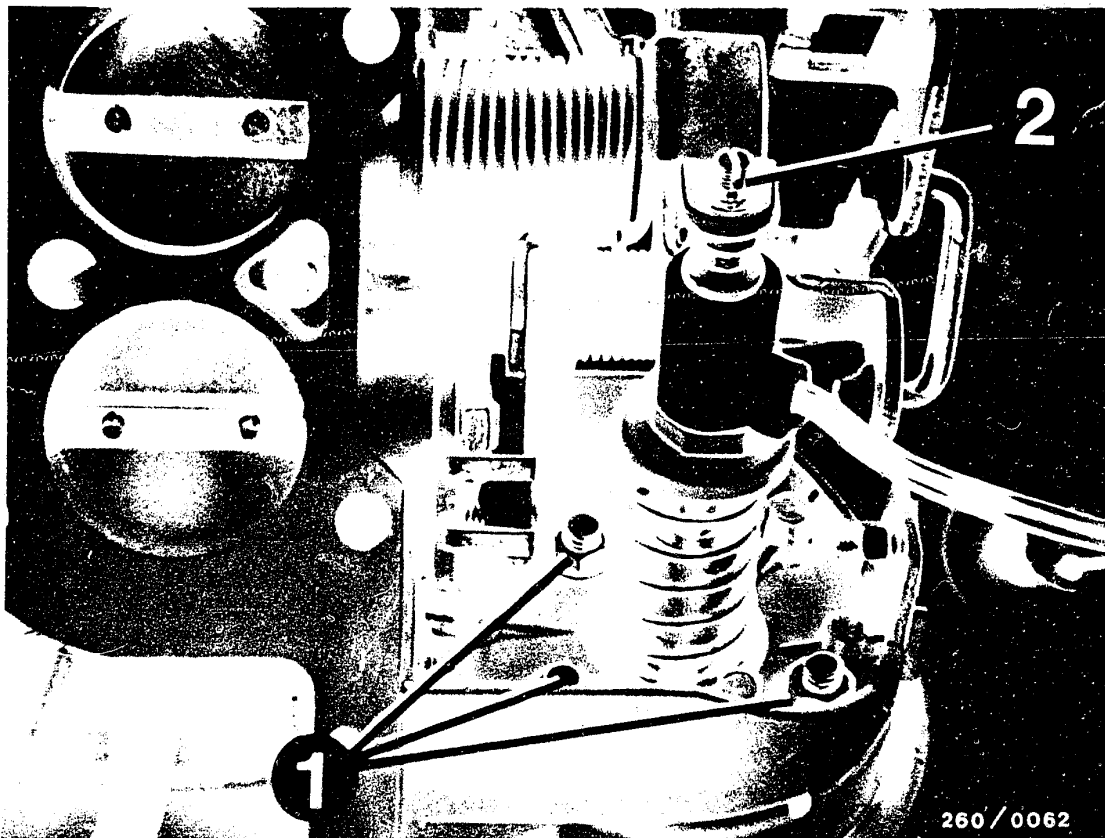
at idle-mixture-adjusting screw.

**H8**

Dirt in carburetor/corrosion

BMW 316, 518





## 20. Replace throttle-valve positioner

Try replacing throttle-valve positioner if engine frequently stops when declutching

Remove air filter.

Disconnect all plugs and hose connections, to the extent necessary, from the carburetor.

Remove carburetor.

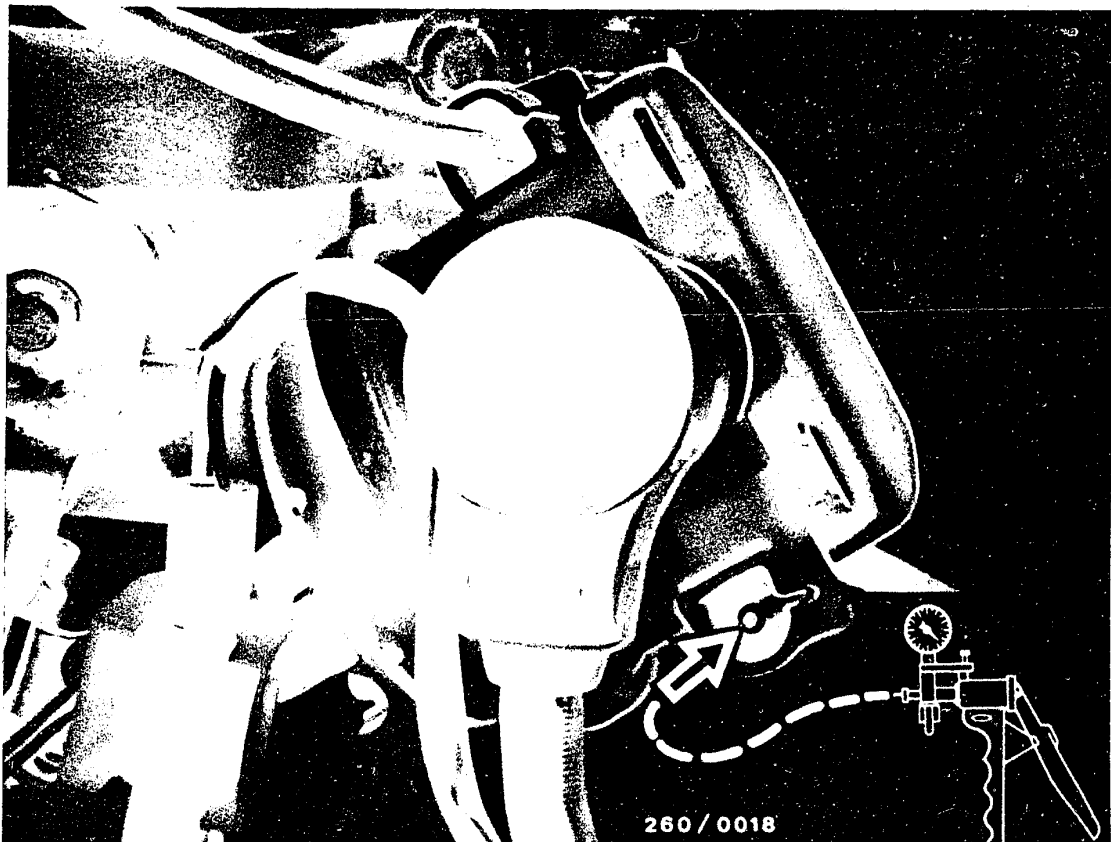
Loosen 3 fastening nuts (1) and remove throttle-valve positioner.

Replace idle stop screw (2) with a new one.

Install new throttle-valve positioner and mount carburetor.

Re-connect plugs and hoses to carburetor.





Control range of throttle-valve positioner:

Disconnect plug from temperature sensor (on intake manifold).

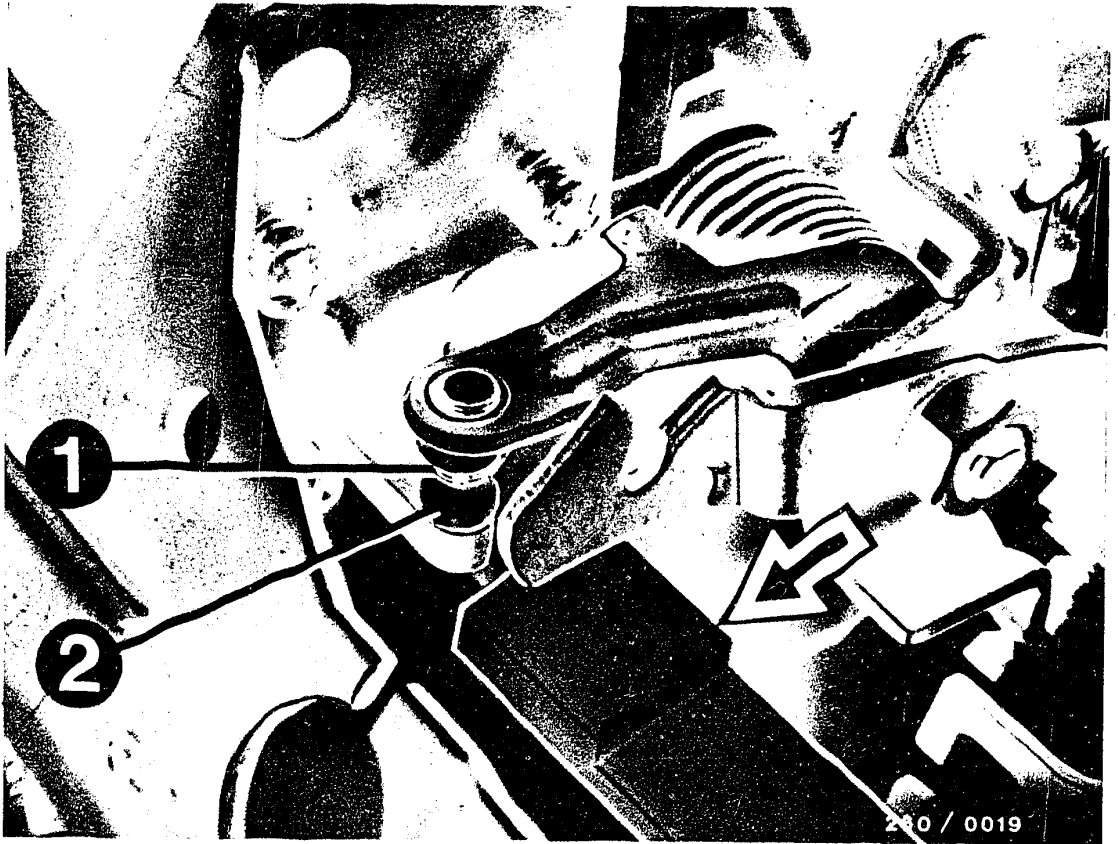
Bridge poles of plug (short-circuit). This simulates a warm engine.

Switch on ignition (do not start engine).

Using hand vacuum pump, generate a constant pressure difference of approx. 250 mbar at the evacuating valve while adjusting.

(The ram of the throttle-valve positioner moves into a position-regulated position.)





In this position a feeler gauge of 6.84 mm must be able to glide between throttle-valve stop screw (1) and stop (2).

Adjust at new idle stop screw.

Break off head of idle stop screw.

Check idling.

Mount air filter.

## 21. Check operation of ignition-control valve

Disconnect vacuum line for ignition-control valve from carburetor and seal (e.g. with a conical punch).

Disconnect vacuum line from vacuum unit of ignition distributor and connect vacuum pump to hose line.

Switch on ignition.

Accelerator in idle position.

- Press button 6 (warm engine simulation) on universal test adapter while testing.

Operate vacuum pump. There must be no pressure difference.

If there is a pressure difference, then replace ignition-control valve.

- Press button 5 (cold engine simulation) on universal test adapter while testing.

Produce a vacuum (approx. 250 mbar) using vacuum pump.

Remove conical punch (or similar). Pressure difference must now be reduced again.

If pressure difference cannot be produced, or if pressure difference is not reduced, check vacuum lines for damage. If necessary, replace ignition-control valve.

Remove vacuum pump.

Re-establish hose connections.



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